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COMMERCIAL FISHERIES REVIEW



A REVIEW OF DEVELOPMENTS AND NEWS OF THE FISHERY INDUSTRIES
PREPARED IN THE BRANCH OF COMMERCIAL FISHERIES

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INTERSTATE FISHERY COOPERATION AND CONSERVATION

By Albert M. Day*

INTRODUCTION

With the signing of the Gulf States Marine Fisheries Compact on July 16, 1949, at Mobile, Alabama, and the formal organization of the Interstate Commission established by that Compact, it seems appropriate at this time to review the genesis of the interstate compact idea as an aid to fishery conservation.

The Gulf States Marine Fisheries Commission is the third such organization that has come into being during the last ten years. The first was the Atlantic States Marine Fisheries Compact approved in 1942, and the second, the Pacific States Marine Fisheries Compact approved in 1947. If the device of interstate cooperation in the consideration of fishery conservation problems of mutual interest had been a failure in the instance of the Atlantic States Marine Fisheries Commission, the other two would not have been established with the approval of the legislators of the various States and with the consent of the United States Congress.

FISHERY REGULATIONS AND CONSERVATION BACKGROUND

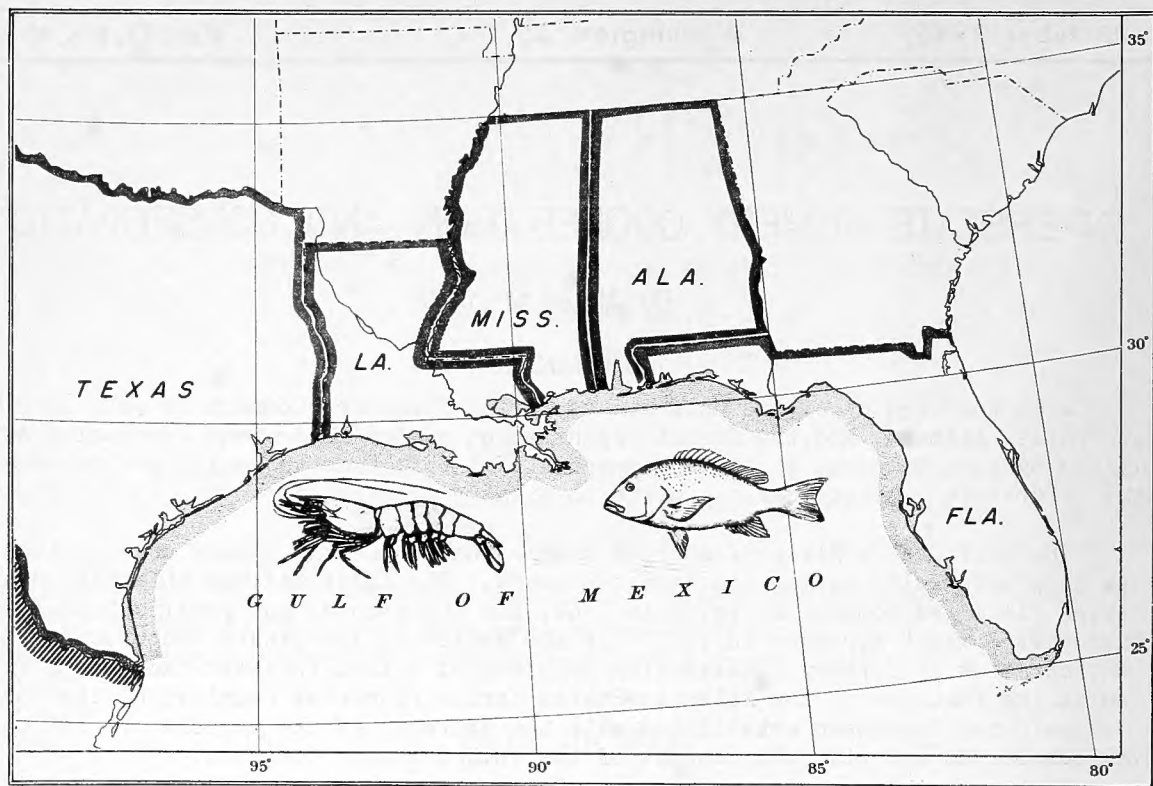
The history of fishery regulation in the United States has shown that the uncoordinated piecemeal approach by individual States has largely been a dismal failure. The lack of respect for county, State, or National boundaries shown by the individual species that make up the fishery resource is the main reason for that failure. The shrimp resources of the Gulf of Mexico are common to all of the Gulf States; so is the menhaden resource. These same resources in the Gulf are contiguous to the resources in the South Atlantic Ocean. Shad and striped bass range along a big stretch of the Atlantic Coast--so with other species. Some States have attempted to regulate the fisheries in one manner, some in another, some not at all.

The late William H. Loutit, for many years Chairman of the Michigan Conservation Commission, once said in criticism of the manner in which fishery conservation regulations were handled by most States, "The fish have at last found that politics is a damn poor diet." His implication was that conservation regulations enacted by State legislators with little or no factual knowledge of the fisheries themselves, but on the basis of the representation of political pressure groups, were largely unsatisfactory. Such regulations were merely a "stab in the dark" often designed to meet some crisis in a particular fishery that had occurred some time previously.

The need for research as a foundation for fishery conservation was recognized by the Congress of the United States in 1871 when it established the position of Commissioner of Fisheries and gave him the responsibility of determining "whether any and what diminution in the number of food fishes of the coasts and lakes of the United States has taken place; and if so, to what causes the same is due, and also

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NOTE: This article was adapted from an address ("Problems of Fishery Conservation") delivered by the author at the signing of the Gulf States Marine Fisheries Compact on July 16, 1949, at Mobile, Alabama. For further details on the signing and organization of this Interstate Commission, see p. 27 of this issue.

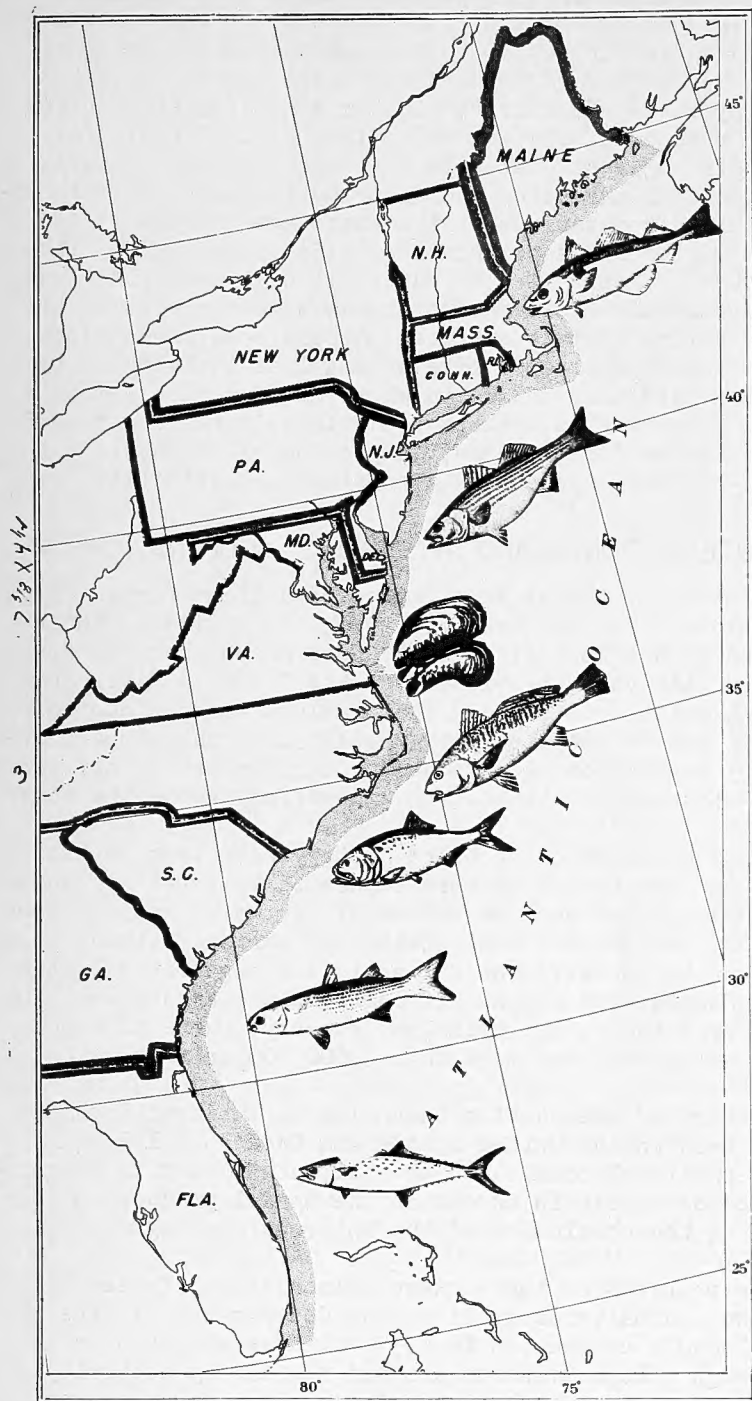


THE GULF STATES MARINE FISHERIES COMMISSION AREA. THE GULF STATES ARE THE SOURCE OF THE LARGEST SHRIMP FISHERY IN THE WORLD. OTHER IMPORTANT FISHERIES INCLUDE THE FOLLOWING SPECIES OF FISH AND SHELLFISH: MULLET (TAKEN LARGELY ON THE WEST COAST OF FLORIDA), MENHADEN, RED SNAPPER, OYSTERS, AND CRABS. BECAUSE FLORIDA HAS TWO COASTS, IT BELONGS BOTH TO THE ATLANTIC STATES MARINE FISHERIES COMMISSION AND THE GULF STATES MARINE FISHERIES COMMISSION. ALTHOUGH MISSISSIPPI HAS NOT YET PASSED AN ENABLING ACT, IT IS FORESEEN THAT IT WILL DO SO AS SOON AS THE LEGISLATURE OF THAT STATE CONVENES NEXT YEAR.

whether any and what.....measures should be adopted in the premises....." It was many years before the Federal Government geared itself into the real job intended by Congress. A whole new science had to be developed to meet the need; personnel had to be trained. Even after the new science had been developed to a degree that it knew what it was doing and some competent men were available to engage in that science, funds to support adequate researches were lacking.

One by one many of the States saw that they needed scientific research staffs, and they came into being. This research alone did not solve the problem of fishery conservation in the States. Federal research agencies and the state investigators often have supplied the "when" and "how" of fishery regulation within the limitations of their perennially inadequate funds. The slow machinery of obtaining legislation and the modifying influence on that legislation of pressure groups and personal expediency frequently resulted in the enactment of a "too little" and "too late" makeshift that was of little use in meeting the conservation problem.

Fortunately for fishery conservation today, many of the state legislators in their wisdom have cast aside the device of fishery regulation exclusively by legislative enactment. These legislators have vested regulatory authority in the fishery



ATLANTIC STATES MARINE FISHERIES COMMISSION AREA. THE MOST IMPORTANT FISHERIES ON THE ATLANTIC COAST INCLUDE THE FOLLOWING SPECIES OF FISH AND SHELLFISH: HADDOCK, ROSEFISH, COD, POLLOCK, WHITING, FLOUNDERS, MENHADEN, SHAD, ALEWIVES, STRIPED BASS, CROAKER, BUTTERFISH, SCUP, SPANISH MACKEREL, SHRIMP, CLAMS, BLUE CRAB, LOBSTER, AND OYSTERS.

administrative officials or commissions of their States. These men or bodies can apply regulations in accordance with the evidence and exactly when they become necessary. If experience shows that a particular regulation can be relaxed or needs to be strengthened, no time need be lost. Discretionary control vested in the States' officials is but one step in attaining the goal of good fishery management.

UNIFORM FISHERY REGULATIONS

The desirability of uniform regulations for the same species of fish in the States that share the same resource in a particular ocean, lake, or river system has been advocated and recognized in many parts of the United States. One of the great fisheries where such uniform regulations have been needed for the last 50 years or more is located in the Great Lakes. Federal and State fishery research agencies frequently have pooled their talents and made recommendations for such uniform regulations. On some lakes uniformity has been partially achieved, but not in a very satisfactory manner. The State whose regulations were the most liberal—which permitted the capture of the smallest fish, use of the smallest size nets, and gave the fish the poorest chance for survival and growth to maturity—became the standard

to which all of the regulations of the neighboring States tended to conform.

Fish do not conform to State boundaries, or to Federal boundaries for that matter. Fishermen insofar as they must engage in interstate commerce to market their product are handicapped by State "boundaries" in the form of different regulations for the same species in adjacent States. Such lack of uniformity for the same species in the waters in adjacent States is the root of another evil. Let me cite one example: Toledo as a marketing and distribution center for freshwater fish receives wall-eyed pike from various States where the minimum size limit prescribed by regulation varies anywhere from 13 to 15½ inches. The fishermen whose State laws force them to return to the water all wall-eyed pike less than 15½ inches long are at an economic disadvantage in the same market with the fishermen who may retain 13 inch fish of that species. At the same time, since the Toledo market can legally receive wall-eyed pike as small as 13 inches, it becomes an outlet for fish taken illegally in States whose minimum size limit is greater than 13 inches. Since fish move to markets today largely by trucks and airplanes, instead of railroads as in former years, inspection of shipments within each State destined for out-of-state markets is a physical impossibility.

PARALLEL BETWEEN INTERNATIONAL AND INTERSTATE COOPERATION

Because the voluntary adoption by two or more States of uniform fishery regulations based on scientific evidence has not been fruitful, the device of interstate cooperation was suggested by the Council of State Governments some 12 years ago. The device had been tried many years previously on the Columbia River in a compact between Oregon and Washington but failed. That failure was not due to the interstate compact idea itself, but to the machinery imposed upon the compact organization. No uniform fishery regulation recommended by the compacting officials could become effective in one State until it had been made effective in the other.

International disputes from the time of recorded history have been settled and international problems of concern to two or more adjacent countries have been solved by international agreements. Fur-seal resources of the north Pacific Ocean were almost totally destroyed by unregulated exploitation of various nations. In 1911, an international agreement to conserve the fur seals was negotiated by the United States, Great Britain, Russia, and Japan. At the time the treaty went into force, the herds on the Pribilof Islands, the principal rockery, numbered about 130,000 animals. By 1947 the herds numbered more than 3,600,000 animals.

The declining halibut fishery of the Pacific Ocean led to the establishment of an international agreement between the United States and Canada in 1924. Under regulations imposed by an international commission the halibut fishery is now producing more than 10,000,000 pounds a year in excess of the annual production in the years immediately preceeding the conclusion of the international agreement.

In order to deal with the problems of the sockeye salmon of the Fraser River System, which fishery has shown a disastrous decline, the Governments of the United States and Canada concluded a convention in 1937 which established an international commission. Although this commission assumed regulatory authority for the first time about three years ago, it has undertaken other measures to improve the abundance of the resource. The fishery is in a much healthier state now than at any time since 1913, and improvements may be forecast for future years.

The tuna fisheries of the Pacific Coast are one of the most important branches of the industry. American boats range over waters from off the coast of the Pacific northwest to the Galapagos Islands, or a straight-line distance of over 5,000 miles.

Tuna fishermen depend for supplies of bait taken largely within the territorial waters of Mexico and the Central American Republics. There have been signs through reduced catch per unit of fishing effort that the tuna resources may be fished too heavily. In recognition of the need for cooperative international research on tuna, the United States concluded an agreement with Mexico on January 25, 1949, and one with Costa Rica on May 31, 1949, for the purpose of establishing international commissions empowered to conduct scientific investigations of the tuna and to make recommendations on conservation to Governments.

The whaling resources of the world have been under study pursuant to international agreement since 1931. The basic agreement has been changed from time to time by incorporating certain minimum regulations and providing for the gathering of scientific information on whales. This type of international action was not strong enough to do effective conservation work. As a result, on December 2, 1946, some 22 nations concluded an international agreement which established a whaling commission empowered to conduct investigations and to regulate whaling throughout all of the marine waters of the globe. This new international commission held its first meeting in London early in June this year.

The fisheries of the northwest Atlantic Ocean have provided the battleground for some of the thorniest international problems dating back prior to American independence. There have been arbitrations from time to time to settle various disputes, but the basic problem of conserving and managing the resources has never been attacked. Fishermen of the United States and Canada have opposed regulation by their Governments alone on an individual basis because United States or Canadian fishermen would be forced to operate under regulations that did not apply to vessels of four or five other nations fishing in the same waters. Because of the unmistakable signs of the decline in the yield of certain fisheries, ten nations assembled at Washington last January. Their deliberations resulted in the signature on February 8, 1949, of an international agreement providing for the establishment of an international commission which is empowered to conduct investigations and to develop regulations which will be implemented by the various Governments signatory to the agreement. We now have a strong mechanism to safeguard the northwest Atlantic fisheries.

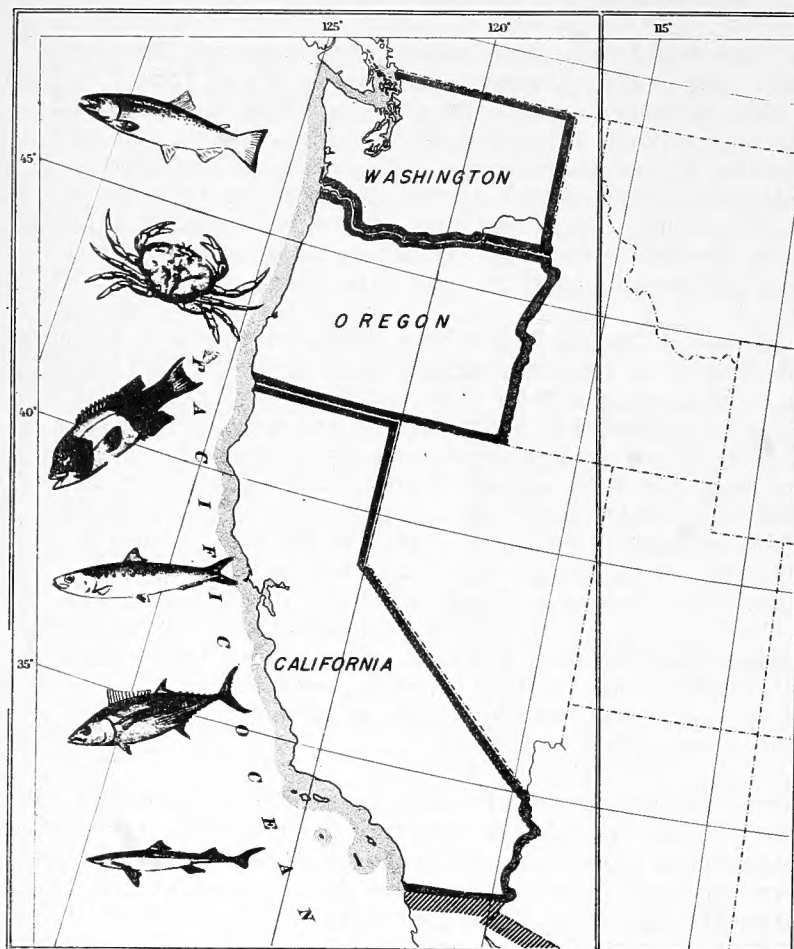
If international agreements permit nations to work together on a unified basis for the investigation and conservation of fishery resources, why can't States work together under a similar arrangement? The Atlantic States Marine Fisheries Commission has proven that States can work together and develop recommendations based on investigations and advice obtained from State research agencies and from Federal agencies. These recommendations are carried back by the individual members of the Commission to the States and are pushed through into regulation. One hundred percent success has not been achieved, but there has been significant progress. The first annual report of the Pacific Marine Fisheries Commission indicates that in the first year that group has made considerable progress and has reached agreement on many fishery issues of common concern.

To the extent that the members of any Commission work as a unit in the interest of better fishery management, they may expect to achieve success. That success will be achieved by cooperation, by occasional concessions in the interest of unanimity.

THE GULF STATES MARINE FISHERIES COMMISSION

The Fish and Wildlife Service is ready at all times to assist the Gulf States Marine Fisheries Commission, or any other Commission, with advice and suggestions

based on its research and experience. Research activities in the fisheries of the Gulf of Mexico on the part of the Federal Government have never been large nor have they encompassed all of the fishery problems. The fate of recommendations resulting from research that has been carried on has been discouraging at times.



PACIFIC MARINE FISHERIES COMMISSION AREA. THE PACIFIC STATES' MOST IMPORTANT FISHERIES INCLUDE THE FOLLOWING SPECIES OF FISH AND SHELLFISH: SALMON, HALIBUT, SARDINE, TUNA, SHARKS (INCLUDING GRAYFISH), FLOUNDERS, ROCKFISHES, LINGCOD, MACKEREL, CRABS, OYSTERS, AND SQUID.

The creation of this new interstate organization dedicated to the investigation, conservation, and development of the fisheries of the Gulf of Mexico is encouraging and another link in the chain of interstate fisheries cooperation. Significant of the growing recognition of the importance of the problems surrounding the Gulf fisheries is the fact that this year the Fish and Wildlife Service acquired two research vessels for use in the Gulf of Mexico when the President signed a bill transferring them from another Federal agency. The program for those vessels and the funds to operate them should result, at least in part, from the planning, recommendations, and initiative of the Gulf States Marine Fisheries Commission. Good fishery research programs are expensive. Appropriations, whether by the United States Congress or State legislatures, are difficult to obtain. By pooling funds, facilities, personnel, and other resources under cooperative arrangements bigger and more adequate research programs can be conducted

than by proceeding independently and unilaterally.

It is hoped that this Commission will consider as its first task the formulation of an adequate fishery research program to meet the needs of the fisheries of the Gulf

of Mexico in which all States share. In such activities, representatives of the Fish and Wildlife Service will be made available to advise the Commission, and in carrying out the research program the Service will attempt to undertake whatever portion it can. The representatives of each State might similarly insure that their States contribute funds, facilities, and personnel toward a research program that is badly needed.

REGULATORY AUTHORITY FOR INTERSTATE FISHERIES COMMISSIONS

As the work of these interstate commissions proves fruitful, vesting them with additional authority, possibly some degree of regulatory functioning, eventually might be desirable. Some of our international commissions were originally investigative and advisory but later acquired regulatory authority when they had established the need for such authority and had proved their competence. The Atlantic States Marine Fisheries Commission, after several years of investigative and advisory action, is now seeking to acquire, in a limited way, some regulatory authority toward amendment of the original interstate compact.



Canned Crab Industry of Japan

Japan was the first country to can crab meat successfully. Because of the need for exportable goods, this industry was developed to the greatest possible extent, and Japanese canned crab meat has been in world-wide demand since 1924. The United States and England have been the leading consumers of this product. From 1924-41, 3,288,997 cases, or 55 percent of the total canned crab export, were shipped to the United States, and 1,648,812 cases, or 27.6 percent, were exported to England.

From 1927-39, the Japanese canned crab industry attained an average annual production of 445,102 standard cases of 48 one-pound cans, with the maximum production of 613,089 cases in 1930.

Although this amount is not large compared with other Japanese canned products, the foreign exchange resulting from the export of practically the entire production of canned crab meat has made the industry one of considerable importance to Japanese economy.

All of Japan's crab canning factory ships were sunk during World War II, and all crabbing areas except those immediately adjacent to Hokkaido were lost at the cessation of hostilities. This once extensive industry is now confined to seven land-based canneries on the northern and eastern coasts of Hokkaido.

--Fishery Leaflet 314

THE MUSSEL RESOURCES OF THE NORTH ATLANTIC REGIONS

PART II - OBSERVATIONS ON THE BIOLOGY AND THE METHODS OF COLLECTING AND PROCESSING THE MUSSEL

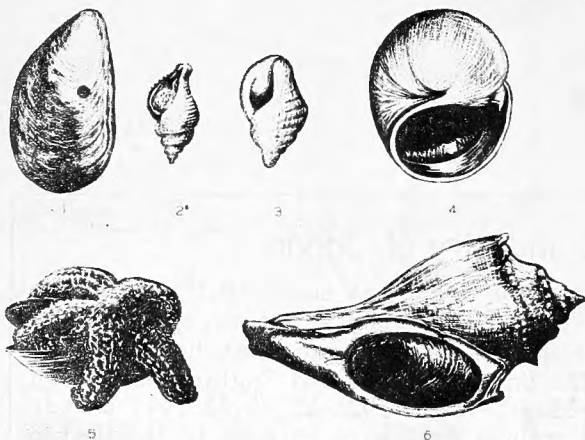
By Leslie W. Scattergood* and Clyde C. Taylor**

INTRODUCTION

This is the second of three papers concerning the World War II efforts to develop a mussel fishery in the North Atlantic region. The first article dealt with the survey to discover whether supplies of mussels were great enough to support a large fishery. The present paper is concerned with biological and technological observations made during the mussel survey.

SIZES OF MUSSELS

Table 3 reveals some interesting characteristics of the size distribution of the mussels on the beds. An examination of the table shows that there are many



SOME OF THE MUSSEL'S ENEMIES:

1. A SEA MUSSEL WHICH HAS BEEN PERFORATED BY ONE OF THE WINKLES.
2. THE OYSTER DRILL (*UROSALPINX CINEREA*).
3. THE DOG WHELK (*PURPURA LAPILLUS*).
4. THE WINKLE (*LUNATIA HEROS*).
5. THE STARFISH (*ASTERIAS FORBESII*) ATTACKING A MUSSEL.
6. THE CONCH (*BUSYCON CARICA*).

localities in which there is no well defined and distinct mode indicative of the young from the summer's set. Only Pleasant River, Narraguagus River, Winter Harbor, and Duxbury Bay have such modes. The absence of distinct year-size groups is even more apparent in the areas below low tide at Ingall's Island, Jim's Island, Moon Ledge, Skillings River, Sheep Island, Mackerel Cove, Maddaket Harbor, and off Brewster. In these eight localities, between 92.7 and 100 percent of the mussels were over two inches in length. There is little information available concerning the growth of mussels under natural conditions in the North Atlantic region. Mossop (1921, 1922) states that mussels grew 10.8 mm (.43 inches) per year at

St. Andrews, New Brunswick, in the intertidal zone, while on a submerged reef the growth was 14.8 mm (.58 inches). At Sorrento, Maine, in October 1946 the mussel spat averaged .13 inches in length and ranged from .01 to .34 inches.

It does not seem possible that lack of small mussels in many of the localities during September, October, and November, can be attributed to rapid growth of the year's spat to the three-or four-inch size. It would seem more likely that the survival of the spat is variable from year to year. Lambert (1935) reported that

* Fishery Biologist, } Branch of Fishery Biology, U. S. Fish and Wildlife Service.
** Formerly Biological Aid, }

Note: Part I (The Survey to Discover the Locations and Areas of the North Atlantic Mussel Producing Beds) of this series appeared in the September 1949 issue of Commercial Fisheries Review, pp. 1-10.

the production of spat from the Zeland mussel beds was very irregular from year to year. Mossop (1921) stated that some years are poor spat producers in New Brunswick, and Storrow (1940) cited the disappearance of 1936 spat and the failure of any successful spat formation in 1937 and 1938 at Whitby, England. Hobson, Storrow, Leach, and Wright (1935) reported that the fall of spat at Blyth, England, was unimportant during two or three years prior to 1935, and that this condition was also true at Budle Bay and Holy Island. Observations at Sorrento and Sullivan, Maine, during 1946 revealed that, although no spat had set on the natural beds, a heavy set of spat had occurred on brush which had been put on the flats in hope of encouraging the successful settling of clams. This spat failed to survive the winter except for a negligible portion which set close to the mud. While mussels are reared in the Baltic on hardwood branches thrust into the mud, such a method of culture might not be economically feasible in the United States because of labor costs. Possible methods for cultivation of this species are given by Loosanoff (1942, 1943a).

On all ten beds from which mussels were taken both from below and above the low-tide mark, the mussels from below were larger than those from above. (Figure 5 shows this difference in size.)

The larger size of the submerged mussels is characteristic of most North Atlantic mussel beds. Studies on the St. Andrews, New Brunswick, mussels by Mossop (1921, 1922), Coulthard (1929), Newcombe (1935), and Warren (1936) demonstrated that the rate of growth varied inversely with the exposure between tides. Another factor, not yet clearly evaluated, is the possibility that there is a decreased mortality among the submerged mussels and they are able to grow to a larger size. No attempt was made during the survey to analyze the growth rate of the mussel populations.

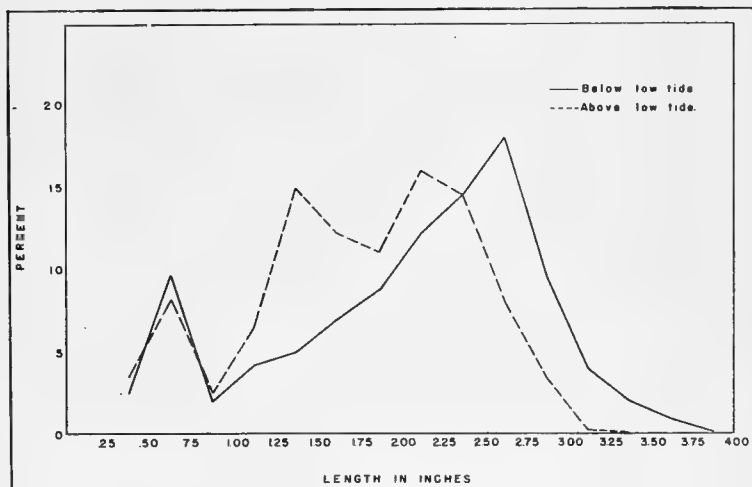


FIGURE 5 - SIZE OF MUSSELS FROM ABOVE AND BELOW LOW TIDE ON TEN MAINE MUSSEL BEDS.

The mussel beds of New Brunswick, Maine, and New Hampshire are situated near the low-tide mark. Very few mussels are found more than three feet below the low-tide level. Huntsman (1918), Mossop (1921), Newcombe (1935), and Warren (1936) remarked on the absence of New Brunswick mussels in depths of over a fathom, and believed that predators, such as, starfish (*Asterias vulgaris* and *A. forbesii*), sea urchins (*Strongylocentrotus drobachiensis*), whelks (*Buccinum undatum*), cockles (*Polinices heros*), and drills (*Thais lapillus*) were responsible. These predators, in general, do not occur in less than a fathom.

In contrast, many beds in Cape Cod Bay, Buzzard's Bay, and other southern New England localities are located in depths of over 40 feet. During dredging operations in Cape Cod Bay, starfish, sea urchins, and whelks (Table 2)¹ were collected with mussels. This would indicate that either these predators were in such small numbers as not to prevent the establishment of beds in subtidal depths, or perhaps factors other than predators influence the depth at which mussels grow.

¹/Appeared in Part I published in September 1949 issue of Commercial Fisheries Review.

Table 3 - Sizes of mussels from various areas

Locality	Date	Depth in Relation to Mean Low Water Feet	Dead Mussels by Volume Percent	Live Mussels												Average size (above 2 1/2 inches) inches	Above 2 1/2 inches Percent			
				L i v e M u s s e l s																
				No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		No.	No.	
New Brunswick:	Nov. 17, 1943	2 to 0	74	3	11	24	23	7	-	-	-	-	-	-	-	-	1.31	8.1		
	do	2 to 0	101	-	1	22	38	35	5	-	-	-	-	-	-	-	1.16	0.0		
	do	2 to -1	114	-	-	1	6	49	50	8	-	-	-	-	-	-	1.48	0.0		
	do	2 to -1	166	-	-	5	19	42	58	35	6	1	-	-	-	-	1.56	4.2		
	do	2 to 0	134	-	-	1	9	15	48	48	12	3	-	-	-	-	2.17	45.5		
	do	2 to 0	62	-	-	1	9	28	19	2	2	-	-	-	-	-	1.43	3.2		
	do	2 to 0	120	-	-	14	28	35	28	13	2	-	-	-	-	-	1.14	0.0		
	do	2 to 0	91	-	-	3	15	50	21	2	-	-	-	-	-	-	1.63	2.2		
	do	2 to 0	60	-	-	1	28	26	4	-	-	-	-	-	-	-	1.24	0.0		
	do	2 to 0	125	-	-	1	7	13	34	12	1	-	-	-	-	-	1.07	0.8		
Maine, Caspary-Quaker Section:	Oct. 12, 1943	2 to 0	91	-	-	3	15	50	21	2	-	-	-	-	-	-	1.63	2.2		
	do	2 to 0	60	-	-	1	28	26	4	-	-	-	-	-	-	-	1.24	0.0		
	do	2 to 0	125	-	-	1	7	13	34	12	1	-	-	-	-	-	1.07	0.8		
	do	2 to 0	124	-	-	-	-	-	-	-	-	-	-	-	-	-	1.99	41.9		
	do	2 to 0	199	-	-	6	9	5	73	70	20	2	-	-	-	-	1.69	11.6		
	do	2 to 0	164	-	-	1	10	15	71	63	4	-	-	-	-	-	1.68	2.4		
	do	2 to 0	127	-	-	1	1	1	5	18	25	32	22	10	8	-	2.33	78.7		
	do	2 to 0	122	-	-	1	1	1	1	1	25	2	2	-	-	-	2.16	21.2		
	do	2 to 0	135	-	-	1	3	18	30	14	29	22	2	-	-	-	1.63	2.2		
	do	2 to 0	185	-	-	4	1	2	2	8	10	15	20	17	10	2	1.88	48.5		
Maine, Frenchman Bay Section:	Oct. 21, 1942	2 to 0	185	-	-	2	6	4	22	26	27	43	36	18	7	-	2.50	85.1		
	do	2 to 0	185	-	-	2	6	4	22	26	27	43	36	18	7	-	2.50	85.1		
	do	2 to 0	185	-	-	2	6	4	22	26	27	43	36	18	7	-	2.50	85.1		
	do	2 to 0	185	-	-	2	6	4	22	26	27	43	36	18	7	-	2.50	85.1		
	do	2 to 0	185	-	-	2	6	4	22	26	27	43	36	18	7	-	2.50	85.1		
	do	2 to 0	185	-	-	2	6	4	22	26	27	43	36	18	7	-	2.50	85.1		
	do	2 to 0	185	-	-	2	6	4	22	26	27	43	36	18	7	-	2.50	85.1		
	do	2 to 0	185	-	-	2	6	4	22	26	27	43	36	18	7	-	2.50	85.1		
	do	2 to 0	185	-	-	2	6	4	22	26	27	43	36	18	7	-	2.50	85.1		
	do	2 to 0	185	-	-	2	6	4	22	26	27	43	36	18	7	-	2.50	85.1		
Maine, West Penobscot Bay Sec.:	Nov. 5, 1942	2 to -2	190	-	-	17	68	47	14	8	5	3	4	2	4	1	-	2.69	9.5	
	do	2 to -2	157	-	-	2	4	5	3	32	19	8	12	40	19	-	-	1.98	53.7	
	do	2 to 0	212	-	-	14	5	3	32	19	8	12	40	19	-	-	1.62	33.5		
	do	2 to -2	241	-	-	2	5	7	12	18	14	13	13	14	18	6	1	1.95	47.4	
	do	2 to -2	226	-	-	1	2	1	2	10	16	18	29	11	12	4	2	1	2.26	70.6
	do	2 to -2	264	-	-	10	13	8	19	35	18	4	16	5	1	1	1	3.18	99.6	
	do	2 to -2	46	-	-	-	-	-	-	-	-	-	-	-	-	-	1.47	25.0		
	do	2 to -2	95	-	-	-	-	-	-	-	-	-	-	-	-	-	1.98	100.0		
	do	2 to 0	274	-	-	-	-	-	-	-	-	-	-	-	-	-	2.56	2.42		
	do	2 to -2	110	-	-	1	1	2	6	1	1	25	14	24	13	6	-	2.25	74.5	
Maine, West Penobscot Bay Sec.:	Nov. 8, 1942	2 to -2	145	-	-	2	6	7	3	27	35	38	48	70	20	6	1	2.81	97.8	
	do	2 to -2	127	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	1	1	3	5	17	16	16	19	27	11	1	1	2.16	67.2	
	do	2 to -2	164	-	-	1	5	8	15	17	16	16	19	27	11	1	1	2.16	67.2	
	do	2 to -2	187	-	-	1	1	1	1	1	6	4	11	10	6	4	1	1.91	45.7	
	do	2 to -2	309	-	-	-	-	-	-	-	-	-	-	-	-	-	2.34	75.5		
	do	2 to -2	314	-	-	-	-	-	-	-	-	-	-	-	-	-	2.61	97.2		
	do	2 to -2	309	-	-	-	-	-	-	-	-	-	-	-	-	-	2.61	97.2		
	do	2 to -2	314	-	-	-	-	-	-	-	-	-	-	-	-	-	2.61	97.2		
	do	2 to -2	309	-	-	-	-	-	-	-	-	-	-	-	-	-	2.61	97.2		
Maine, West Penobscot Bay Sec.:	Nov. 15, 1942	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
Maine, West Penobscot Bay Sec.:	Nov. 20, 1942	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
Maine, West Penobscot Bay Sec.:	Nov. 20, 1942	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
Maine, West Penobscot Bay Sec.:	Nov. 20, 1942	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
	do	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-	2.61	65.0	
Maine, West Penobscot Bay Sec.:	Nov. 20, 1942	2 to -2	122	-	-	2	3	5	12	12	9	13	20	22	11	2	-			

2/Not recorded.

2/Calculated from original ungrouped measurements.

The upper limits of the beds are determined by the effect of exposure on young mussel larvae, according to Mossop (1921). Undoubtedly, the larger mussels also suffer considerable mortality from exposure to temperature extremes and to the erosion of ice or storms. Crows, gulls, and ducks may also be important factors in some regions.

MEAT YIELDS

The seasonal variation in the yield of mussel meats is of great importance, both to those engaged in processing mussels and to the conservationists. To har-

Table 4 - Pounds of Raw Mussel Meats per Bushel at Various Localities

Locality	Date	Quantity of Meat per Bushel			
		Depth in Feet in Relation to Mean Low-water			
		2 to 0	0 to -2	2 to -2	-25 to -40
		Pounds	Pounds	Pounds	Pounds
Maine, Jonesport Section:					
Indian River	Oct. 20, 1942	-	10.9	-	-
West River	do	9.6	-	-	-
Cape Split Harbor	Oct. 21, 1942	14.4	14.8	-	-
Pleasant River, Reef Point..	Oct. 23, 1942	12.7	14.8	-	-
Harrington River, Ripley Is.	Oct. 30, 1942	-	13.1	-	-
Narraguagus River, Back Bay.	Oct. 31, 1942	-	-	12.2	-
Pinkham Cove	Nov. 2, 1942	-	-	11.4	-
Joy Bay	Nov. 3, 1942	-	-	12.2	-
Average		12.2	13.4	11.9	-
Maine, East Penobscot Bay Sec.:					
Winter Harbor	Nov. 5, 1942	-	-	19.4	-
Stave Island Harbor	do	12.3	14.8	-	-
Hog Island	Nov. 10, 1942	-	-	12.7	-
Soward's Island	Nov. 11, 1942	-	13.6	-	-
Ingall's Island	Nov. 7, 1942	14.4	16.9	-	-
Sullivan Harbor, Moon Ledge.	Nov. 6, 1942	8.4	13.1	-	-
Raccoon Cove	Nov. 8, 1942	-	-	11.9	-
Skillings River	do	-	12.7	-	-
Bar Harbor	Nov. 9, 1942	-	-	14.8	-
Average		11.7	14.2	14.7	-
Maine, E. Penobscot Bay Sec.:					
Herrick Bay	Nov. 18, 1942	-	-	16.9	-
Centre Harbor	Nov. 15, 1942	-	18.6	-	-
Deer Isle, Fish Creek	Nov. 17, 1942	-	-	17.4	-
Deer Isle, Greenlaw's Cove .	do	-	-	16.1	-
White Island	do	-	-	19.7	-
Jim's Island	do	-	-	21.1	-
Swan's Island, Mackerel Cove	Nov. 23, 1942	13.1	14.4	-	-
Swan's Island, Atlantic					
Harbor	do	13.1	16.9	-	-
Average		13.1	16.6	18.2	-
Maine, W. Penobscot Bay Sec.:					
Muscle Ridge Channel, Sheep					
Island	Nov. 20, 1942	12.2	15.2	-	-
Massachusetts:					
Cape Cod Bay, off Brewster .	May 12, 1943	-	-	-	16.1

vest the shellfish at the peak of their "fatness" is a sound practice, for the processor is able to obtain a greater poundage of meats from a bushel, thus reducing the cost of the meats; the cannery workers operate at greater efficiency by producing more meat weight from the effort expended to shuck out a bushel; and the harvesting of the mussel at its peak provides the maximum production from a given quantity of mussels.

A difference in the meat yields between the Jonesport, Frenchman Bay and East Penobscot Bay regions can be noted from Table 4. It is evident that the East Penobscot Bay mussels were fatter than those of the other two regions, and the Jonesport section mussels had the poorest meats. However, to separate the effect of season and location, samples would have to be taken throughout the year in various sections of the coast. It is interesting to note that when the Maine fishery developed after 1942, the cannery preferred the mussels collected from beds in Frenchman Bay and Penobscot Bay due to the heavy yield of meats in those sections as compared with the Washington County region.

In all eight areas where meat weights were obtained from mussels gathered from above and below low tide, the mussels below low tide had heavier meats. The greater meat yields of the submerged mussels and their larger size were the primary reasons why many Maine canneries insisted that the fishermen collect mussels from below the intertidal zone.

To determine the seasonal variation of mussel yields, two localities in Boothbay Harbor, Maine, were selected as sampling stations. Station A was located two feet above the mean low-water mark and Station B was at the mean low-water mark. Due to unusual ice conditions and the loss of the mussels by freezing, Station B had to be abandoned in December. Table 5 shows the yield of fresh mussel meats between October 1943 and August 1944. From these data it is apparent that Boothbay Harbor mussels reach their peak condition in June and gain relatively little weight during August through February.

The weekly yield of steamed meats at a Maine cannery is shown in Table 6. The mussels had been steamed 12 minutes at 212 degrees Fahrenheit before being opened. The shellfish were collected during the 1943-44 season from the same region in Muscongus Bay; therefore, the yields can be considered as representative of that particular locality. During the period December 11 to January 22 the yields tended to decrease; but thereafter began to increase to the end of the season on May 6, when the cannery began experiencing difficulties in handling the meats, which have a tendency to break apart when the spawn is fully developed.

Table 5 - Yield of Fresh Mussel Meats at Boothbay Harbor, Maine

Date	Quantity of Meats per Bushel	
	Station A	Station B ^{1/}
	Pounds	Pounds
1943:		
Oct. 8	11.0	11.8
18	-	13.6
20	12.2	-
25	13.5	14.3
Nov. 1	11.3	-
2	-	13.2
7	11.9	-
25	12.3	12.8
Dec. 2	-	13.2
3	11.8	-
20	11.2	-
1944:		
Feb. 22	12.5	-
Apr. 4	15.4	-
May 7	17.5	-
June 4	19.3	-
July 8	11.4	-
Aug. 2	11.7	-

^{1/}Mussels destroyed at Station B by freezing during December.

To compare the fresh-shucked yields with those of steamed mussels, it is necessary to apply a conversion factor of 0.5 to the fresh weights. This factor is a rough approximation, for the yield of steamed mussels is inversely affected by the temperature and duration of the steaming process, both of which shrink the fresh meats.

MUSSEL PEARLS

White or bluish white pearls are commonly found in mussel meats. These pearls are valueless, for their small sizes, lack of lustre, and irregular shapes preclude their use in jewelry. As these pearls are usually very small, they are not general-

ly noticed by the consumer to any greater extent than he would notice occasional grains of sand in clams or oysters. However, if the pearls are over one milli-

meter in diameter and very numerous, they are not only annoying, but may cause damage to the consumer's teeth. On rare occasions, pearls have been found which measure more than six millimeters in diameter; fortunately, most pearls are less than one millimeter in diameter. The presence of large and numerous pearls might prove to be a deterrent to the sale of mussels; consequently, a method of eliminating this nuisance was sought.

The pearls are embedded in the flesh of the mantle and cannot be seen easily when the gonads are approaching maturity in the winter and spring. No practical method has been developed to detect all the pearls in the meats or to separate mechanically the pearls from the mantle without tearing the latter to shreds. Often it is possible to discover excessively pearly mussels as they are being removed from the

shells, or while they are being weighed into the cans, and such meats should be discarded. Several of the canneries have workers detailed to remove all conspicuously pearly meats. The rejection of such meats is only a partial solution to the problem because many of the embedded pearls would not be seen.

During the survey, the quantities of pearls present in mussels collected from various beds were determined by a simple laboratory method of maceration. Three ounces of fresh meats were placed in a quart of boiling water and one ounce of potassium hydroxide was added. The solution was then boiled for five minutes. When the meats became thoroughly macerated, the pearls dropped to the bottom of the container from which they could be easily removed. With one exception, no attempt was made in the field to remove the tiny pearls of less than about .25 millimeters from the mixture of sand and debris, for such pearls were so small that their presence would hardly be detected by the consumer. In a later experiment, to evaluate the effect of acetic acid on pearls, all pearls visible under a low power microscope were measured.

Table 7 shows the numbers and sizes of pearls from each three-ounce sample of meats taken from the various beds. Although all areas contained pearls to a greater or lesser extent, the occurrence of the larger and most objectionable ones was limited. At the end of the Maine survey in 1942, it was felt that, until further study was made, mussels should not be taken from those beds whose samples showed the greatest numbers of large pearls. It was decided to consider as beds to be temporarily avoided those areas whose samples had either more than nine pearls with

Table 6 - Yield of Meats per Bushel of Steamed Mussels at a Maine Cannery during 1943-44 Season

Week Ending	Operating Days	Bushels Processed	Total Meat Yield	Meat Yield per Bushel
	Number	Number	Pounds	Pounds
1943:				
Dec. 4	4	460.0	2,700.3	5.87
11	6	764.5	4,800.7	6.28
18	5	456.0	2,802.2	6.15
25	4	480.0	2,828.4	5.89
1944:				
Jan. 1	4	464.0	2,830.6	6.10
8	3	403.0	2,321.8	5.76
15	5	540.0	3,213.9	5.95
22	5	551.0	3,221.3	5.85
29	5	549.0	3,497.8	6.37
Feb. 5	4	588.0	3,883.7	6.60
12	5	614.5	4,136.1	6.73
19	3	374.0	2,468.8	6.60
26	6	893.0	6,433.0	7.20
Mar. 4	6	766.0	5,552.3	7.25
11	6	800.0	6,022.2	7.53
18	5	809.0	6,176.6	7.63
25	5	690.0	5,211.5	7.55
Apr. 1	6	826.0	6,566.9	7.95
8	5	865.0	7,395.9	8.55
15	5	684.0	5,970.6	8.73
22	5	712.0	6,425.6	9.02
29	5	704.0	6,279.0	8.92
May 6	1	120.0	1,122.6	9.36
Total	108	14,113.0	101,861.8	7.22

a diameter of one millimeter and greater, or more than three pearls with a 1.5 millimeter diameter and greater in a three-ounce sample of fresh drained meats. By use of such standards, about one-fifth of the total estimated mussel production would be eliminated, but this quantity would not seriously interfere with the potential fishery. The areas which would thus be banned temporarily from the mussel supply were: Back Bay, Skillings River, Ripley Islands, Long Point, State Island, and Joy Bay, which had a total estimated supply of 60,000 bushels. Cannery were advised in January 1943 to avoid these areas until a further study was made.

Table 7 - Number of Pearls from Commercially Important Mussel Beds^{1/}

Location of Bed	Diameter of Pearls in Millimeters Along Longest Axis										
	Q u a n t i t y								Summary		
	0.25 to 0.99	1.00 to 1.24	1.25 to 1.49	1.50 to 1.74	1.75 to 1.99	2.00 to 2.24	2.25 to 2.49	2.50 to 2.74	1 mm and over	1.50 mm and over	1.75 mm and over
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Maine:											
Mackerel Cove	17	-	-	-	-	-	-	-	-	-	-
Pemaquid River	7	1	-	-	-	-	-	-	1	-	-
Centre Harbor	18	1	-	-	-	-	-	-	1	-	-
Hog Island	3	-	1	-	-	-	-	-	1	-	-
Herrick Bay	4	-	-	1	-	-	-	-	1	1	-
Winter Harbor	6	-	-	1	-	-	-	-	1	1	-
White Island	13	2	-	-	-	-	-	-	2	-	-
Pinkham Bay ^{2/}	10	1	-	1	-	-	-	-	2	1	-
Cape Split Harbor	1	-	1	-	1	-	-	-	2	1	1
Fish Creek	10	-	1	-	1	-	-	-	2	1	1
Jim's Island	3	1	1	-	1	-	-	-	3	1	1
Moon Ledge	13	1	-	2	-	-	-	-	3	2	-
Raccoon Cove	4	3	1	-	-	-	-	-	4	-	-
Goose Islands	5	3	1	-	-	-	-	-	4	-	-
Indian River	5	4	-	1	-	-	-	-	5	1	-
Ingall's Island	4	4	-	-	-	1	-	-	5	1	1
Greenlaw's Cove	5	-	2	3	-	-	-	-	5	3	-
Sheep Island	12	2	-	3	-	-	-	-	5	3	-
Reef Point	8	5	1	2	-	1	-	-	9	3	1
Soward's Island	19	4	2	1	1	-	-	1	9	3	2
Back Bay	18	1	2	4	-	2	-	-	9	6	2
Skillings River	17	5	2	4	-	1	-	-	12	5	1
Ripley Islands	49	9	6	2	-	-	-	-	17	2	1
Long Point	112	11	3	7	-	-	-	-	21	7	-
State Island	53	10	4	6	2	-	-	-	22	8	2
Joy Bay	78	12	4	7	1	5	-	-	29	13	6
Massachusetts:											
Cape Cod Bay off											
Brewster	18	3	-	-	-	-	-	-	3	-	-

^{1/}Number of pearls from 3 ounces of mussel meats. Meats were obtained from mixed samples of mussels collected from parts of each bed.

^{2/}Includes Dyer Harbor.

It was realized that the problem of eliminating the pearls from the meats would be more easily solved if it were possible to dissolve the pearls in the meats without seriously altering the flavor or texture of the meats. Examination of canned vinegar-preserved mussels had revealed that pearls were absent from the meats, although the mussels had been taken from the Narraguagus River area where pearls are common and often large. It appeared that acetic acid might be a pearl-dissolving agent.

In 1943, shortly after the Maine survey was completed, we performed an experiment to determine the effect of acetic acid on pearls. A similar experiment

was effected by the U. S. Food and Drug Administration shortly thereafter. Eight No. 1 picnic cans were each filled with six ounces of meats from steamed Cape Cod Bay mussels. Four different 3-percent salt solutions were prepared—with 1 percent, $\frac{1}{2}$ percent, $\frac{1}{4}$ percent, and 0 percent acetic acid concentrations. Two cans of meats were filled with each of these solutions, sealed, processed for 30 minutes at 240° F., and opened 10 days later. The flavor of the meats from those cans containing 1-percent and $\frac{1}{2}$ -percent acetic acid was slightly sour, but not unpleasantly so. The pearls were then removed from the mussels in each can by the potassium hydroxide maceration method and measured with a stage micrometer on a low-power microscope.

Table 8 shows the results of this experiment. Each can contained six ounces of steamed meats and, as the shrinkage of fresh meats under the steaming process

Table 8 - Effect of Acetic Acid on Mussel Pearls

Number of Cans	Solution	Diameter of Pearls Measured in Millimeters Along Longest Axis								
		Below .50	.50 to .99	1.00 to 1.49	1.50 to 1.99	2.00 to 2.49	2.50 to 2.99	3.00 to 3.49	3.50 to 3.99	Total
		No.	No.	No.	No.	No.	No.	No.	No.	No.
1	3% salt and 1% acetic acid	4	1	-	-	-	-	-	-	5
1	do	5	3	-	-	-	-	-	-	8
Total 2		9	4	-	-	-	-	-	-	13
1	3% salt and $\frac{1}{2}$ % acetic acid	23	22	5	1	-	-	-	-	51
1	do	13	6	-	1	1	-	-	-	21
Total 2		36	28	5	2	1	-	-	-	72
1	3% salt and $\frac{1}{4}$ % acetic acid	158	31	2	3	-	-	-	-	194
1	do	85	29	9	-	2	-	-	-	125
Total 2		243	60	11	3	2	-	-	-	319
1	3% salt and no acetic acid	507	55	9	-	1	1	-	-	573
1	do	775	37	4	1	2	-	-	1	820
Total 2		1,282	92	13	1	3	1	-	1	1,393

in this instance was about 50 percent, each can had the equivalent of 12 ounces of fresh meats, or four times as much as the samples shown in Table 7. The dissolving effect of the acid on pearls is clearly indicated. While the acid-treated pearls were being measured, it was noticed that the acid had completely softened the small pearls, which would crumble when touched, and had dissolved the outer layers of the large pearls so that they were considerably reduced in size. The effect of time on the dissolving action of the acetic acid was not shown by this single experiment. It is probable that a longer storage period would have reduced further the number of pearls.

After further investigation of this problem, the U. S. Pure Food and Drug Administration advised the canners that a certain concentration of acetic acid should be added to the canned mussels. Some canneries began using vinegar and continue to do so, while others depend upon the ability of their help to see and reject pearly meats.

Although there are a number of possible explanations for the presence of pearls in mussels, they are believed generally to be the result of a parasite. Jameson (1902) believed that most mussel pearls result from the encystment of an immature trematode worm and the subsequent deposition of pearly matter around the worm. Herdman (1904), also studying the pearls of English *Mytilus edulis*, found pearls very

common at Piel and likewise believed that the distomid trematode larva, Distomum somaterias, is largely responsible for the pearls. Stafford (1912) stated that pearls in considerable numbers can be found in Mytilus edulis on the Gaspé coast of Canada, and larvae similar to Distomum somateriae are found in the mussel. The adult form of the worm inhabits the intestines of the eider duck and the scoter duck (Oidemia sp.) both of which are common on the New England coast. No attempt was made during this mussel survey to ascertain the origin and study the formation of pearls in the New England mussels.

GEAR

The equipment used in harvesting mussels varies with the nature of the beds. In New Brunswick and Maine most of the mussels are exposed at extreme low tides; however, the edges of the beds are usually under several feet of water at mean low water. The submerged mussels are gathered easily by use of a long-handled clam hoe or manure fork, and this gear is also used to collect the exposed mussels. In some instances mussels have been picked from the beds by hand, but this method does not permit the collecting of many mussels during the low-tide interval.

One of the most useful tools for mussel fishing is the quahog rake. This implement is about the size of an ordinary garden rake and has teeth three inches long. A wire basket with a capacity of about eight quarts is attached behind the teeth and holds the mussels which are raked from the bottom. Using this rake from a boat, it is possible to gather mussels easily from depths of one to four feet of water. If the fisherman is skillful, shellfish from depths of over ten feet can be harvested in this way. A long-handled clam hoe or manure fork can be used in a similar fashion but, as solitary mussels usually fall off the teeth, it has the disadvantage of not being efficient, except in areas where the mussels are clustered and attached to each other. As the quahog rake has a wire basket, the mussels can be washed free of mud and some shells, by vigorously agitating the basket in the water before the mussels are dumped into the boat. It is impossible to wash the mussels in such a fashion when the clam hoe or manure fork is employed. Due to wartime conditions, quahog rakes were not available to fishermen, so this gear has not been used in the Maine fishery.

Tongs can also be employed for gathering submerged mussels, but this method is quite slow. During the survey, tongs were sometimes used, but were found to be inefficient on mud bottoms where mussels usually live. Great difficulty was experienced in trying to remove from the tongs the mud and shells which were usually mixed with the live mussels.

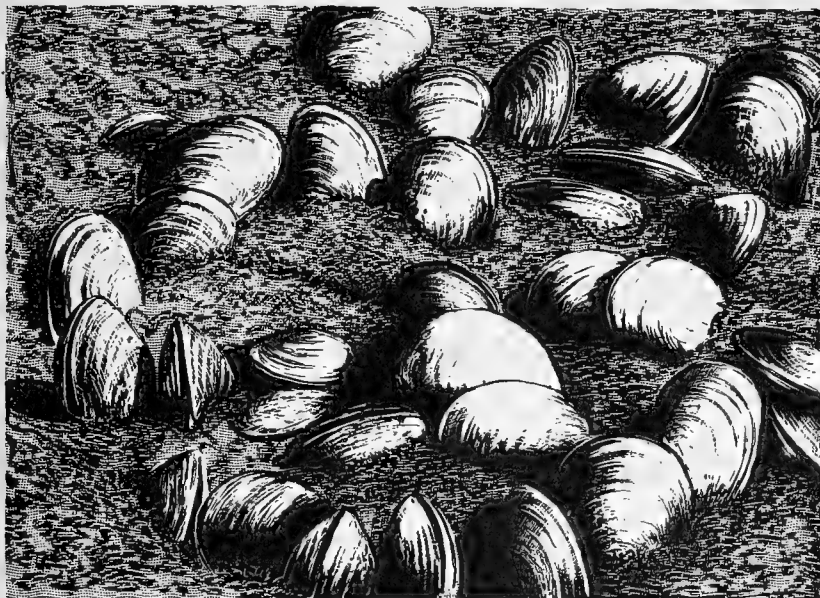
In Cape Cod, Buzzards and Narragansett Bays, and in Long Island Sound, mussels of marketable size are found in deep-water beds and require the use of an oyster or scallop dredge, altered to retain mussels of two inches or more in length. Such a dredge will not be an especially efficient gear for releasing small mussels after they have entered the dredge, for many mussels are found in clusters, rather than as solitary individuals. Dredges are now sometimes used in Maine in localities where this gear can be operated over the beds at high water. On those bottoms where the mussels are too thinly distributed to be profitably harvested by hoes, forks, or rakes, the dredge can be operated to good advantage; thus it permits a more thorough reduction of the marketable mussel population. What effect the dredge has on the future productivity of the bottom is not known.

Because of the simple gear by which mussels can be harvested, there was no shortage of mussel-fishing equipment. Neither was there an urgent need for new

boats, as the dories, skiffs, and small power boats engaged in lobstering, clamming, and dredging were generally suitable. The only innovation was the use of small flat bottom shallow draft scows to transport mussels from the beds to the shore. In the Frenchman Bay area, where the mussel fishery was prosecuted actively, such scows were commonly employed.

CANNING FACILITIES

During the 1942 survey it was found that there were sufficient canning facilities to pack millions of pounds of mussels annually. Twenty potential Maine mus-



THE CHARACTERISTIC POSITION OF LIVE SEA MUSSELS. THE ANTERIOR END BURIED IN THE SAND OR MUD AND THE POSTERIOR OR SIPHON END PROJECTING WELL ABOVE THE LEVEL OF THE BOTTOM.

sel factories were located in the region between Jonesboro and Friendship. Of ten cannery operators contacted personally, nine were very much interested in processing mussels. At five canneries it was possible to can sample packs of mussels in 1942. The large sardine factories at Eastport and Lubec were unfortunately without a convenient supply of mussels, for no large quantities were found in that region and adjacent New Brunswick by the survey. In Massachusetts, several Boston and Gloucester canneries indicated

their interest in mussels and sample packs also were made there.

There was little or no seasonal conflict between the canning of mussels and other types of processed foods. The peak months of fish and vegetable canning are in the summer and fall seasons during which period mussel meats are relatively thin and, therefore, less valuable for canning. Clams are packed during the winter and spring months, but the supply of clams available for canning was only sufficient to enable nine out of twelve clam canneries to operate in 1942 and those nine had been at only 15 to 20 percent capacity for several years prior to 1942. The decrease in clam canning was due to the increased marketing of freshly-shucked clam meats, and to a shortage of both clams and diggers.

The equipment necessary for canning mussels differs little from that employed in clam canning. The same retorts, sealing machinery, and meat-washing devices are used. Any fish cannery having sealing machinery for "round" cans would be able to pack mussels also. All mussels should be washed in a cylindrical revolving drum, and this apparatus was soon adopted by those canneries handling mussels on a large scale. Thus, conversion to mussel canning was relatively simple.

LABOR SUPPLY

In 1942 there was a fairly adequate supply of female labor for mussel canning, especially during the winter when other fish processing was at a minimum. Male labor was not plentiful, but it was felt that the canneries would be able to secure enough men if they could operate on a larger scale during the season of relative inactivity. It was hoped that the mussel fishery would not only provide an additional supply of protein food, but also supply employment for cannery help during the slack season. This hope was realized as the fishery developed and the maintenance of experienced cannery crews was aided by providing them with more regular work.

In Maine, the clam diggers in the regions where mussels were abundant have been able to increase their production of food per man by gathering both mussels and clams. Some lobstermen were also mussel harvesters and prosecuted the mussel fishery during the late winter and early spring months when the returns from lobster fishing were low. In Massachusetts, where the mussels were found in deeper water, the scallop, quahog and sea clam fishermen were able to dredge mussels with little change in equipment. In all instances, there was an increase in the food production per man when the fishermen shifted from other shellfish harvesting to mussels.

PROCESSING

There are three forms in which mussels can be marketed:

1. Fresh, in the shell or shucked
2. Quick frozen
3. Canned

Mussels also can be dehydrated, but whether or not they would be acceptable to the public in this form is questionable. One disadvantage of marketing fresh mussels is apparent--it would have to be limited to population centers not far distant from the source of the shellfish, for mussels do not keep well except under special conditions. It was felt that during the period when mussels were being introduced to a greater segment of the public, it would be likely that gluts would occur, and spoilage might have resultant bad effects on future sales.

Little study has been carried on concerning the possibility of marketing quick-frozen mussels. The effect of long periods of storage on the flavor, appearance, and nutritive values of frozen mussels is not known certainly, although samples of mussels frozen for four months have been rather disappointing due to a slightly bitter taste, dark color, and toughened texture. Until further technological studies of this problem have been conducted, North Atlantic mussels probably will continue to be marketed primarily as a canned product.

The marketing of canned mussels resulted in an almost unlimited range of distribution, with little if any opportunity for spoilage. During the course of the survey, samples of mussels were shipped to a number of canners who were interested in the possibilities of mussel canning and experimental packs were prepared. The following methods were found to be most satisfactory in the experimental work, and were adopted by most of the mussel canners when the fishery later developed.

At the cannery, the mussels were washed in an apparatus similar to the cylindrical fish scaler used for redfish, herring, alewives, etc. The agitation of the mussels, together with the force of the streams of water directed upon them, caused

any mud-filled shells to open and the mud to be washed out. The mud-filled shells are difficult to detect otherwise, and, if not removed, will either break apart during steaming or at the shucking table, with a resultant mixing of meats and mud. When thus smeared with mud, the meats must be washed more vigorously and consequently will often break apart and produce an inferior pack.

A live mussel is much more difficult to open than a clam, and in the process, the meat usually is torn. Steaming causes the mussels to open and makes it possible to pick the meats out rapidly. The loss in weight from steaming is an advantage since it prevents excessive shrinkage later in the cans when they are processed. The mussels are steamed in a retort for eight to ten minutes at 240° F. A shorter period of steaming does not open all the shells. A longer period tends to toughen the foot and mantle.

The bouillon from the mussels can be included in the canned or frozen product, as it adds slightly to the food content of the pack. Comparisons indicated that the addition of bouillon did not seem to increase materially the flavor of the product. This liquid from the steamed mussels, if used, should be strained and clarified, for it has a very cloudy appearance.

After steaming, the mussels were taken to the shuckers who removed the meats from the shells and the byssus, or hair, from the meats. Preliminary tests showed that the total time needed to prepare a bushel of steamed mussels for canning was one-half that required for soft clams. It is not necessary to remove a tough siphon, as with the clams, and both the mantle muscles and the foot are tender. Special care, however, must be taken to remove the byssal hairs, which have an unpleasant appearance. In regions south of Cape Cod, mussels are often hosts to the mussel crab (Pinnotheres maculatus). This small crustacean, about $\frac{1}{2}$ inch long lives commensally in the mantle cavity of the mussel and should be removed from the mussel meats during the shucking operation. Although the crab is edible and esteemed by epicures, its presence in mussel meats is not appreciated by the average consumer.

The shucked meats were washed in either salt or fresh water to remove any small amount of mud which might be present. The meats then were weighed into cans. The meats should not be soaked in either fresh or salt water prior to canning. This procedure, which is sometimes used for clams, results in such a decided loss of flavor within a few hours that the soaked meats are almost tasteless. The soaking toughens the mantle and foot muscles and furthermore softens the reproductive organs to such an extent that they may crumble. Consequently, with toughened and broken meats, the product is poor in appearance and texture.

Successful packs were processed by the cannery at temperatures of 240° F. for 30 minutes in a No. 1 picnic can having a drained weight content of 6½ ounces of mussel meats. Quick cooling of the cans after retorting seemed to be desirable. Further studies on the technique of mussel canning have been carried out by the technological laboratories of the Fish and Wildlife Service.

According to scallop fishermen, large beds of horse mussels (Modiolus modiolus) exist along the Maine coast. In order to explore the possibilities of developing a fishery for this species, an experimental pack was processed at a cannery in Southwest Harbor, Maine, in July 1943. The mussels were dredged from submerged beds lying in about 40 feet of water near Jonesport, Maine. Horse mussels are seldom found in any abundance in depths of less than two or three fathoms. The lengths of the mussels on the Jonesport beds ranged from four to six inches.

The horse mussels were processed in the same manner as that used for Mytilus edulis, except that a retort time of about 17 minutes was necessary to open the shells enough for easy shucking. The meats, which were reddish-orange and somewhat tough, were packed in No. 1 picnic cans. Ten to eleven meats produced a drained weight of seven ounces after processing in the can. It was felt that this product would appeal less to the consumer than Mytilus edulis and no attempt was made to promote a fishery for Modiolus modiolus.

(This article will be continued in the November 1949 issue of this periodical)



CONTRIBUTION TO THE BIOLOGY OF THE KING CRAB

If an abundant Alaska king crab population is to be maintained it is imperative that the females be protected. There is no justification for commercial utilization of the female king crab. Not only is the yield of meat small, but she is carrying developing eggs all during the year except for a short period of time just before and after moulting.

King crabs (Paralithodes camtschatica Tilesius) can be caught in much larger amounts and more easily while concentrated in shallow depths during the moulting and mating season. One of the most efficient methods of fishing is to tow trawls along the floor of the ocean and scoop up the schools of mating crabs. Observations made on board crab fishing vessels operating during the mating season in Bering Sea in 1941 clearly show that trawl fishing caused great destruction of soft shelled crabs. It was found that from twenty-five to nearly one hundred percent of all females taken in trawls at this time were either killed outright or were injured so severely they would die. Damage was extensive from the last week in April, when Bering Sea was first entered, until the latter part of May. After the first of June, the shell of the females had hardened sufficiently so that trawling caused practically no damage.

Tangle nets, being a fixed gear, cause much less damage than trawls to soft shelled crabs. This is largely due to the fact that only as crabs move about on the bottom are they caught in this gear, and since moulting and soft shelled crabs are much less active than hard shelled ones, they are much less likely to come into contact with the nets. This gear catches large quantities of male crabs as they move about in search of females during the mating season, but if of proper construction, it catches and injures very few females.

—Fishery Leaflet 340



August 1949

College Park, Md.

At the end of nine months of storage, the striped bass fillets held at -10° F. and at fluctuating temperatures between 0° and -10° F. have shown practically no change over the previous monthly examination. The palatability scores, although nearing the lower limit of acceptability, are changing very slowly. The score was the same for both lots. A slight fishy odor was noticeable upon thawing, but the fillets were reasonably satisfactory in appearance. The group held at 0° F. failed to receive a satisfactory palatability score at this time, although the odor and appearance upon thawing were not too poor.

* * *

The frozen fish having different wrapping and glazing combinations have shown practically no change in weight after five months of storage at 0° F. Slight changes in appearance have occurred in some samples, however. The fish that were first frozen, then glazed and wrapped in cellophane, showed slight desiccation in the belly cavity. This is true also for the fish that were wrapped first and then frozen without a glaze; and this lot also showed slight surface drying. The fish that were first wrapped in vegetable parchment, then dipped in water, followed by wrapping in cellophane and then freezing, were still in excellent condition. Although the last method is intended primarily for locker-storage-plant use, it may be adaptable to other types of frozen storage.

Ketchikan, Alaska

Pilot plant trials of methods for production of oil by alkali digestion of salmon cannery waste indicate that best recovery of oil and vitamin A is obtained using $1\frac{1}{2}$ percent sodium hydroxide and cooking at 200° F. for 36 minutes. Digestions at higher temperatures were difficult to handle and at lower temperatures proceeded too slowly.

* * *

Over 800 pink salmon fillets were packaged, frozen and stored in the laboratory's controlled temperature cold storage to determine practical procedures for commercial freezing of this species. Several antioxidants and packaging methods are under test.

* * *

Nearly nine tons of salmon cannery waste were prepared for use by the Experimental Fur Station at Petersburg in its feeding tests with mink and foxes. A little more than half of the material was frozen raw; the rest was ground and processed in four-pound cans.

Seattle, Wash.

Work was resumed on the project to improve methods for oil analysis of fish meal. Although addition of pumice to fish livers was an aid in giving maximum oil extraction, it was found that there was no advantage in its use in the analysis of fish meal.

* * *

Studies were begun on the freezing of sockeye and pink salmon for later canning. In order to evaluate the factors on freezing and storage which have a bearing on the quality of the canned product, fresh salmon are being frozen and stored for various periods of time before thawing and canning.

* * *

Preliminary preparations were made for experiments on canning of salmon waste to determine the effectiveness of this method of preservation in retaining the various vitamins and nutritive factors contained in the viscera.

* * *

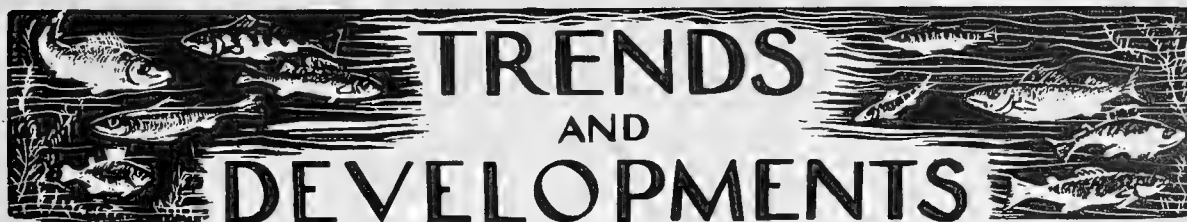
Preliminary work was begun on development of methods for determining vitamin B₁₂ in hatchery foods and other materials.



PACKAGING FROZEN FISHERY PRODUCTS

Fish and shellfish may be classified arbitrarily into two broad groups, depending upon the fat content of the muscle tissue. The non-fatty fish comprise one group which includes those fish the flesh of which contains less than 3% fat. The fat or oil of these fish is generally stored in the liver; haddock and cod are examples. The other group, which is made up of fatty fish, includes those which store their fat in the muscle tissues of the body. The flesh of these fish contains more than 3% fat and in some species as much as 20%. Salmon and mackerel are examples of fish included in this group. Shellfish are classified as non-fatty, since their flesh contains very little fat.

--Fishery Leaflet 324



TRENDS AND DEVELOPMENTS

Additions to the Fleet of U. S. Fishing Vessels

A total of 124 vessels of 5 net tons and over received their first documents as fishing craft during July 1949—8 more than in July 1948, according to the Bureau of Customs of the Treasury Department. California led with 37 vessels documented, followed by Washington with 26, and Florida with 8. During the first 7 months of 1949, a total of 622 vessels were documented, compared with 682 during the same period in 1948.

Vessels Obtaining Their First Documents as Fishing Craft, July 1949					
Section	July		Seven mos. ending with July		Total
	1949	1948	1949	1948	1948
	Number	Number	Number	Number	Number
New England	6	6	20	32	52
Middle Atlantic	4	3	34	30	40
Chesapeake Bay	9	9	44	29	59
South Atlantic and Gulf	31	48	205	275	541
Pacific Coast	70	40	216	217	347
Great Lakes	2	4	29	29	51
Alaska	5	7	71	63	81
Hawaii	-	2	3	7	12
Total	127	119	622	682	1,183

Note: Vessels have been assigned to the various sections on the basis of their home port.

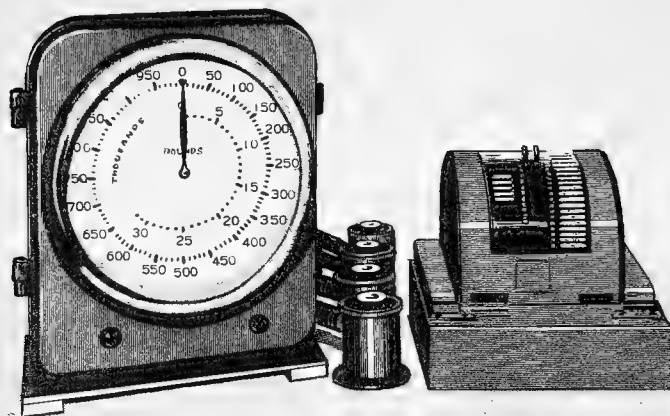


Electronic Scale Developed

An electronic livestock scale which weighs quickly and accurately has been developed by an aircraft corporation under the direction of the Production and Marketing Administration of the U. S. Department of Agriculture, according to that agency's August 1949 Marketing Activities. Employing electronic principles rather than mechanical principles, the scale automatically registers weights on a large dial and prints them on a ticket with the push of a button. This new, accurate, automatic, virtually fool-proof and tamper-proof scale offers possibilities for use in the fishing industry, or any industry requiring large-scale weighings, since it is not affected by dirt, rust, or moisture.

The electronic scale virtually eliminates the shortcomings of the lever-type scale. The heart of the new development—the strain-gage cell with electronic indicator—had been designed previously by the aircraft corporation. Four of the compact cells are placed under the corners of a conventional platform. Each cell electronically transmits its pressure impulse through an electric cable encased in a flexible rubber-covered conduit. The measure of the pressure on the cells

is translated into the recorded weight in an indicator unit, and registered on a 16-inch dial with two concentric graduated circles, the smaller divided plainly



FOUR WEIGHING CELLS (CENTER)--THE SIZE OF PINT FRUIT JARS--ARE THE HEART OF THE SCALE. A SMALL LIGHT BELOW THE DIAL FLASHES GREEN WHEN WEIGHING AND RED WHEN CONTROLS ARE SET FOR PRINTING OR ZEROING. THE PRINTER (RIGHT) CONTAINS ALL THE OPERATIONAL CONTROLS.

at thousand-pound intervals to a capacity of 32,000 pounds, and the larger circle graduated in 5-pound intervals to 1,000 pounds capacity. Two indicator hands, corresponding to the hands of a time clock, combine to register a total that is clearly visible up to distances of at least 10 feet. On the lower section of the indicator assembly are red and green signal lights which show whether the unit is in operation or locked for printing.

On the printer, the third element of the assembly, a series of keys controls a set of type wheels arranged to record the number and species of animals weighed, as well as the initials of the selling agency. This unit is electrically connected to the indicator and it prints simultaneously: the registered weight on the dial, the species and number of animals weighed, and the month, day, hour, and minute in which the weighing is performed. Depending upon the size of the load, the weight value is indicated in two to seven seconds.

Time required for installation is but a fraction of that required for the normal lever-type scale. In the new device, the general compactness and the flexibility of coupling between the cells and the indicator unit establish such a degree of adaptability that the entire mechanism can be installed in approximately one hour where a lever system scale is replaced. All parts are replaceable as units, so that "trouble shooting" and repair are distinctly simplified. Commercial installation of the new scale was expected to begin in September.



Federal Purchases of Fishery Products

DEPARTMENT OF THE ARMY, July 1949: A total of 1,457,729 pounds (valued at \$485,767) of fresh and frozen fishery products was purchased by the Army Quartermaster Corps during July 1949 for the U. S. Army, Navy, Marine Corps, and Air Force for military feeding (see table). This is an increase of 12 percent in

Purchases of Fresh and Frozen Fishery Products by Department of the Army							
Q U A N T I T Y				V A L U E			
J u l y		January-July		J u l y		January-July	
1949	1948	1949	1948	1949	1948	1949	1948
Lbs.	Lbs.	Lbs.	Lbs.	\$	\$	\$	\$
1,457,729	1,513,512	9,338,053	9,438,142	485,767	497,910	3,130,441	3,373,330

quantity and 13 percent in value compared with the previous month, (1,305,391 pounds, valued at \$430,175), but a decline of 4 percent in volume and 1 percent in value with July 1948.

ARMY TO BUY FRESH AND FROZEN FISH IN JAPAN FOR OVERSEAS TROOPS: In line with its policy to purchase locally, foods which are available in quantity in foreign countries, it is learned that the Army's Quartermaster Corps, as of November 1, will stop purchasing fresh and frozen fish in the United States for use by overseas troops stationed in Japan, and will buy from Japanese sources to meet the needs of the occupation troops. This will result in a saving for the Army, especially on transportation charges. Fresh and frozen fish purchases by the Quartermaster Corps in the northwest area of the United States for use by overseas troops have approximated 20 percent of the total Army purchases in that area.

The Quartermaster Corps will continue to purchase fresh and frozen fish in this country to meet the domestic requirements of the Armed Services.



ECA Procurement Authorizations for Fishery Products

Procurement authorizations for commodities and raw materials announced during August 1949 by the Economic Cooperation Administration included \$818,000 for the purchase of fishery products (all from the United States and Possessions), com-

ECA Procurement Authorizations for Fishery Products, August 1949			
Product	Country of Origin	Recipient Country	Amount Authorized
Fish, canned	U.S. & Possessions	Ireland	\$ 200,000
Oil, whale and fish	U.S. & Possessions	Korea	162,000
" , fish ^{2/}	" " "	Bizone Germany	456,000
Total for August 1949			818,000
Total ECA Procurement Authorizations for Fishery Products, April 1, 1948-Aug. 31, 1949			
Fish, canned	U.S. & Possessions & Canada	United Kingdom, Ireland, Greece, Italy, Belgium-Luxembourg	14,582,800
Fish, salted or cured	Newf., Canada, & U.S. & Possessions	Italy & Fr. West Indies	5,229,000
Fish meal	Canada, Iceland, Norway, & Angola	Denmark, Austria, & Bizone Germany	3,956,361
Oil, herring	Iceland	Bizone Germany	1,694,000
" , seal	Newf.	France	257,600
" , shark liver	Latin America except Argentine & Brazil	France	250,000
" , fish	U.S. & Possessions	Bizone & Fr. Zone of Germany & Korea	846,000
" , technical fish	U.S.	Bizone Germany	100,000
" , whale (includes sperm oil)	Netherlands, Belgium, Norway, & U.S.	Austria, Bizone & Fr. Zone of Germany	7,056,150
" , whale and fish	U.S. & Possessions	Korea	162,000
Vit. A (Commercial grade, for stock feed)	U.S.	Netherlands	567,000
Grand Total Authorized			34,700,911
1/Unless otherwise indicated, the recipient country is the procuring agency, and the government of the participating country or its authorized agents or importers do the purchasing.			
2/Dept. of Agriculture designated as procuring agency. Mostly menhaden oil.			

pared with \$550,000 during July 1949. The total amount authorized for the purchase of fishery products during the 17-month period through August 31, 1949, was \$34,700,911.

During August, ECA cancelled an authorization of \$139,000 for sperm whale and fish oils which were to be purchased in the United States and Possessions for delivery to the French Zone of Germany.



Fishery Biology Notes

"ALBATROSS III" - LOCATES A HADDOCK NURSERY GROUND (Cruise 27): On Cruise 27 (August 11-19, 1949), the Albatross III's chief purpose was a census of the fish populations on the Southern New England Banks and Nantucket Shoals, and in South Channel, Cape Cod Bay, and Massachusetts Bay. During the cruise, half-hour tows were made at 59 stations scattered over these areas. Hydrographic observations, consisting of temperatures and bottom topography, were also collected.

The Southern New England Banks south of Martha's Vineyard and Nantucket, and west of Nantucket Lightship (out to 40 fathoms) were found to be a nursery ground for scrod haddock. A large concentration of 1-year old haddock was found 30 miles WNW. of Nantucket Lightship. It is apparent, from the large numbers of 1-year old haddock caught during this and the previous cruise, that 1948 was a successful year for haddock spawning.

Large haddock and redfish were found in commercial quantities in 80 to 120 fathoms in South Channel (the area bounded by latitudes $41^{\circ} 51'$ and $42^{\circ} 20'$ and longitudes $68^{\circ} 50'$ and $69^{\circ} 40'$).

During the first three days of the cruise 191 drift bottles were released, in cooperation with the Woods Hole Oceanographic Institution, in an attempt to determine the speed and direction of ocean currents, at twelve different stations located between Muskegat Channel and Fishers Island in Block Island Sound and from 50 to 70 miles offshore. To date more than 30 of these bottles have been returned from Rhode Island beaches and the eastern end of Long Island.

Two of the yellowtail flounders tagged on the previous cruise have been recaptured. One was landed at Woods Hole and the other was caught by a New Bedford dragger. Both fish were recaptured near the point of release.

* * * * *

BLUE CRABS TAGGED IN RAPPAHANNOCK: The Chesapeake Biological Laboratory (Maryland), the Virginia Fisheries Laboratory and the Fish and Wildlife Service tagged 330 blue crabs in the Rappahannock Estuary between February 28 and March 4, 1949. By June 30, none of the 83 male and 72 female immature crabs had been returned; 27 of the 72 male and 35 of the 113 female mature crabs were returned. The returns from male crabs, in agreement with previous observations, were entirely within the Rappahannock Estuary; the predominant number of returns from male crabs, in agreement with previous observations, were entirely within the Rappahannock Estuary; the predominant number of returns from female crabs was from the main Chesapeake Bay and south of their area of release. A slightly higher portion of males was taken.

* * * * *

SERVICE'S BEAUFORT LABORATORY REACTIVATED: On June 28, 1949, the Service's Beaufort Laboratory, relatively inactive for several years, was given fully active status again within the research program of the Service. It is under the jurisdiction of the Middle and South Atlantic Fishery Investigations of the Branch of Fishery Biology. Summer investigators will be encouraged to use the laboratory. Built before 1910, the laboratory is on an 11-acre tract of Pivers Island and consists of seven major buildings. It provides an opportunity to observe and study fish and related marine conditions in the area.

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SOUTH PACIFIC FISHERY INVESTIGATIONS: Albacore Sighted by "Black Douglas": On a cruise off northern California and Oregon completed on August 18, the Black Douglas, research vessel of the Service's South Pacific Fishery Investigations, located albacore schools in the vicinity of $44^{\circ} 20' N. 126^{\circ} 30' W.$ This information was relayed to commercial fishermen, fishermen's unions, canneries, and other interested groups in Astoria, Coos Bay, and Portland. Fishermen were able to reach the designated area in time to fish the schools. Albacore specimens were taken by biologists aboard the Service's vessel.

Stations Occupied and Observations: The vessel occupied 40 stations between Cape Mendocino and the Columbia River and up to 450 miles offshore during this cruise. At each station observations included a plankton haul, temperature, salinity, oxygen and phosphate determinations, phytoplankton collections, and secchi disk readings.

Operations Are a Cooperative Program: The operations of the Black Douglas are part of a cooperative program on pilchards involving, in addition to the Fish and Wildlife Service, the California Academy of Sciences, the California Division of Fish and Game, and the Scripps Institution of Oceanography. Cruises of the Black Douglas are carried out simultaneously with cruises of the Scripps vessels, Crest and Horizon. Earlier, the California Fish and Game vessel, N. B. Scofield, also participated. The area thus surveyed each month extends from the Columbia River in the north to the middle of Lower California in the south. The results of these surveys will be of great importance, not only in the studies of the sardine, but for any present or future studies of other fishes in this area.



Gulf States Marine Fisheries Commission Organized

On July 16, 1949, the Governor of Alabama placed his signature upon the first official document of the Gulf States Marine Fisheries Compact at Mobile, Alabama, on board the State yacht Dixie, according to the Commission's report. Due to prior commitments and other pressing affairs of State, the governors of Florida, Louisiana, Texas, and Mississippi were unable to attend the formal signing. Thus, after several years of tireless efforts on the part of the Continuing Conference Committee, the Gulf States Marine Fisheries Commission came into existence as a joint interstate cooperative arrangement between the Gulf States to "promote the better utilization of the fisheries, marine, shell, and anadromous, of the seaboard of the Gulf of Mexico, by the development of a joint program for the promotion and protection of such fisheries and the prevention of the physical waste of the fisheries from any cause".

Later, the same day, the first business session of the Commission was called to order. One of the speakers traced the Compact through its formation and of its ultimate ratification as Public Law 66 of the 81st Congress, which was approved by the President of the United States on May 19, 1949. Florida, Alabama, Louisiana, and Texas had passed Enabling Acts, in that order, and it is foreseen that Mississippi will come in as soon as the Legislature of that State convenes next year.

The Director of the U. S. Fish and Wildlife Service discussed "The Problem of the Marine Fisheries". He called attention to recent Federal action assigning two research vessels to the Gulf of Mexico, and these vessels should be in operation in the Gulf by next year. The Director expressed the hope that the Commission would consider among its first tasks the formulation of an adequate fishery research program to meet the needs of the fisheries of the Gulf of Mexico.

The Special Assistant for Fisheries to the Undersecretary of State, Washington, D. C., spoke on "Participation by Interstate Fisheries Commissions in Treaty and Convention-Making". He pointed out that regional commissions formed by states are a big help to the efforts of the Department of State in Washington; and that the work of the State Department embraced the protection of the rights of American fishermen on the high seas.

The Conservation Commissioners of the five Gulf States submitted the official list of three Commissioners from each State to serve for that State during the first year. The Conservation Commissioners are ex-officio members of the Commission and the listings were given as follows:

ALABAMA

Mr. Bert E. Thomas, Director, State Department of Conservation;
Mr. Thomas A. Johnston, III, Member appointed by the Legislature;
Mr. James H. Faulkner, Representative appointed by the Governor.

FLORIDA

Mr. George Vathis, Supervisor, Florida State Board of Conservation;
Mr. William J. Hendry, Member appointed by the Legislature;
Mr. Bryant G. Patton, Representative appointed by the Governor.

LOUISIANA

Mr. Ernest S. Clements, Commissioner, Louisiana Department of Wild Life and Fisheries;
Mr. E. J. Grizzaffi, Member appointed by the Legislature;
Judge Leander H. Perez, Representative appointed by the Governor.

TEXAS

Mr. Howard D. Dodgen, Executive Secretary, Texas Game, Fish and Oyster Commission;
Mr. Jimmy Phillips, Member appointed by the Legislature;
Colonel L. A. Kurtz, Representative appointed by the Governor.

The second phase of the conference involved the permanent Organization. Mr. Bert E. Thomas of Alabama was unanimously elected and chosen as the first Chairman of the Gulf States Marine Fisheries Commission for the ensuing year, and Mr. Howard D. Dodgen of Texas as Vice-Chairman.

The Commission discussed rules and regulation; named the Council of State Governments as temporary secretariat and treasurer of the organization until a permanent secretary and treasurer could be secured; and passed a motion that the temporary office of the Commission be the office of the Chairman until a permanent office is selected at the next meeting.



Indo-Pacific Fisheries Council Accepted by Pakistan

The Government of Pakistan's acceptance of the Agreement reached at Baguio, Republic of the Philippines, on February 28, 1948, for the formation of an Indo-Pacific Fisheries Council, was received by the Food and Agriculture Organization on August 1, 1949. (See Commercial Fisheries Review, May 1949, pp. 22-25.)



Meeting on Proposed Mediterranean Sea Fisheries Council

All Member Governments of the Food and Agriculture Organization were notified of the proposal to establish a Regional Council for the Study of the Sea in the Mediterranean Sea and contiguous waters, and a meeting was called in Rome (September 19 through September 24, 1949) by that agency.

The purpose of the meeting is to consider an agreement for the establishment of a regional council for the scientific exploration of the sea in the area of the Mediterranean Sea and contiguous waters, similar to that drawn up for the Indo-Pacific Fisheries Council (See Commercial Fisheries Review, August 1948, page 17).

Invitations to attend this meeting were sent to all Member Governments of FAO who are interested in the area in question, and also to governments who are not members of FAO but who were members of the International Commission for the Scientific Exploration of the Mediterranean Sea. The United States was also invited, and an officer from the staff of the American Embassy at Rome will act as observer.

The establishment of Regional Fisheries Councils is in accordance with the resolution passed by the Third Session of the Conference of FAO at Geneva in September 1947 "that FAO should take action to initiate the formation of Regional Councils for the scientific exploration of the sea in the parts of the world not now actively served by similar bodies, giving primary consideration to the following areas:

North Western Atlantic, South Western Pacific and Indian Ocean, Mediterranean Sea and contiguous waters, North Eastern Pacific, South Eastern Pacific, Western South Atlantic, and Eastern South Atlantic and Indian Ocean.

Michigan's Great Lakes Fisheries Production, 1948

The commercial production of fishery products in the State of Michigan waters of the Great Lakes during 1948 amounted to 30,103,292 pounds, the highest since 1935. The increase was attributed to the larger catches of whitefish and herring, according to the Division of Fisheries of the Michigan Department of Conservation.

Commercial Production of Fishery Products in Michigan State Waters of the Great Lakes, 1948 ^{1/}						
Species	Lake Michigan	Lake Superior	Lake Huron	Lake Erie	Total 1948	Total 1947
..... (in pounds)						
Blue pike	-	-	-	17,599	17,599	1,300
Bowfin	5	-	10,220	8,076	18,301	19,600
Bullheads	9,160	-	54,332	44,373	107,865	125,500
Burbot	11,563	843	508	146	13,060	8,300
Carp	63,413	4	1,474,354	535,245	2,073,016	1,825,900
Catfish	845	-	188,729	27,111	216,685	313,800
Chubs	2,071,261	15,057	154,027	-	2,240,345	1,524,300
Gizzard shad	-	-	27,705	-	27,705	500
Goldfish	-	-	-	49	49	-
Lake herring	2,886,235	4,515,076	1,641,324	-	9,042,635	6,490,700
Lake trout	590,063	2,158,897	5,144	-	2,754,104	3,152,600
Pike, northern or pickerel ..	16,751	-	48,882	10,439	76,072	19,100
Rock bass	1,461	21	15,747	7,939	25,168	21,000
Sauger	1,684	157	2,277	3,919	8,037	28,000
Sheepshead	6,432	-	4,102	80,585	91,119	119,000
Smelt	624,028	31	1,231	-	625,290	339,100
Sucker, longnose	105,871	19,040	62,236	3	187,150	2/
Sucker, white & redhorse	1,112,840	28,734	1,246,560	41,983	2,430,117	2,270,100
White bass	-	-	1	32,865	32,866	44,900
Whitefish, common	4,272,004	474,432	2,971,948	9,491	7,727,875	7,363,000
Whitefish, Menominee	103,998	17,061	26,107	-	147,166	152,800
Yellow perch	298,441	5,255	693,812	17,480	1,014,988	598,500
Yellow pike	597,633	2,102	223,438	402,907	1,226,080	1,127,500
Totals	12,773,688	7,236,710	8,852,684	1,240,210	30,103,292	25,545,500

1/Subject to slight revision.

2/Included with white and redhorse sucker.



North Carolina Joins Atlantic States Marine Fisheries Commission

The Governor of North Carolina recently signed the Atlantic States Marine Fisheries Compact as authorized by an Act passed during the 1949 session of the legislature of the State, according to the July 1949 Maryland Tidewater News of the Maryland Department of Research and Education. North Carolina's action brings together all of the Atlantic States in a single body whose functions are to consider any and all problems of the fisheries submitted to it by member states, and to bring to these problems the best available information bearing on their solution, whether they involve technology, fishery biology, or further interstate cooperation and coordination.

The Chesapeake states, Maryland and Virginia, have been members of the interstate group since its organization some six years ago. Among the local problems that have received its attention are the maintenance of high levels of crab production, the shad situation and certain aspects of game fish depletion, especially the drum or channel bass.



Pacific Oceanic Fishery Investigations

CONTINUED TUNA RESEARCH IN JUNE: The staff of the Pacific Oceanic Fishery Investigations, Honolulu, T. H., in the Hawaiian, Leeward and Line Islands, continued observations in June on the catch composition, areas of fishing, and production rates of the local long-line tuna fishery. During this month, the catch of yellowfin tuna increased while that of big-eyed tuna decreased, a regular seasonal occurrence. By regular visits to the local wholesale market, staff biologists obtained length and weight frequencies of the catches. Big-eyed tuna in the late June catches were all spent fish, while yellowfin were in very advanced stages of sexual maturity.

In late June, a biologist of POFI went to Saipan to observe local fishing methods and to gather biological data on the skipjack taken in the local fishery. He is particularly interested in morphometric data for comparison with similar data from Japan and Hawaii for the solution of the program of racial distribution of the skipjack.

The large landings of skipjack at Kewalo Basin during June made it possible to gather a good series of morphometric data from 51 big-eyed, 50 yellowfin, 67 skipjack and 12 albacore. Analysis of these data, similar data from the last year's cruises of the Oregon, and data taken by the Territorial Division of Fish and Game awaits completion of these series. Preliminary calculations have been completed of regressions, characterizing the yellowfin and skipjack from the Society and Marquesas Islands, based on measurements of fish landed in Honolulu in April.

HAWAIIAN TUNA FISHERY - July 1949: The Hawaiian tuna fishery was quite variable during July, according to observations made by the POFI staff. From time to time bait shortages were an impediment to both long-line and pole fishing. The long-line bait supply was particularly critical. Since the importation of frozen sardines was impossible because of shipping difficulties, fresh long-line bait cost as much as 80 cents a pound.

The long-line catch was largely yellowfin tuna in contrast to the predominance of big-eyed tuna several months ago. The average catch of 12 vessels interviewed during July was 2.2 fish per 100 hooks per set. This is somewhat lower than the average earlier in the year. Aku fishing fluctuates from very good to very poor. Although probably not the best catch, one sampan started fishing at 8:00 a.m., caught 9,000 pounds of skipjack, and returned to the dock for unloading by 9:30 a.m.

SAIPAN TUNA FISHERY: One of the biologists of the Pacific Oceanic Fishery Investigations went to the Marianas Islands in July to aid in establishing a fishing industry at Saipan and to take morphometric data from the tunas. Although skipjack are present there in commercial quantities, the fishery is at a low ebb.

TUNA GEAR: Several trips were made during July by members of Pacific Oceanic Fishery Investigations on Hawaiian fishing vessels to observe the types of gear in use, the methods of operation, the types of bait-catching gear, methods of catching bait, and behavior of the tunas for the dual purposes of providing the staff members with experience in the local fisheries and establishing a basis for the design of gear for use by POFI.

TRIP TO KONA COAST: A trip was made to the Kona Coast of Hawaii during July to observe the gear and methods of the flag-line fishery and to test various types

of trolling lures. A series of tests were attempted with various lures, but no tuna were present during the week of the tests; even the existing commercial gear gave very meager returns. However, considerable information was obtained on the types of gear in use, which will be of value in future operations.

TUNA-FISHING GEAR AND BAIT: On the basis of practical fishing conditions, certain experimental types of flag-line tuna gear were designed for testing by the vessels of the Pacific Oceanic Fishery Investigations.

During August, observations were made on the methods of catching bait. A trip was made to the Kona Coast of Hawaii to assist in and observe the results of a co-operative testing of a light baiting net obtained from Japan. This net was tested on the Territory vessel, the Makua. Information was obtained on the performance of this net and hanging proportions; and observations were made which should be of value in rigging the Investigations' night baiting nets.

U. S. FISHERY TEAM COMPLETES STUDY OF JAPANESE TUNA FISHERIES: In November 1948, a Pacific Oceanic Fishery Investigations team (composed of three members) arrived in Japan to study the tuna and other pelagic fishery resources of Japan. The third member of this team departed for Honolulu on July 9. The other two members completed their assignments and left Japan March 1.

The objectives of this team were to (1) obtain morphometric measurements and other biological data on Japanese tunas and allied fishes for the purpose of defining the stocks of these fish in the Pacific Ocean, (2) complete a bibliography of Japanese tuna publications, and (3) gather information on Japanese fishing and processing methods and research techniques.

Although highest priority was given to the collection of morphometric data, they could not obtain as much information as desired because of the abnormally late tuna fishing season. However, 117 fish of seven different species were measured. Japan is the only country known to have conducted research on tuna and related fishes in the western Pacific before World War II; therefore, public and private libraries were surveyed in order to prepare a list of Japanese publications relating to these fishes, and a bibliography of about 500 titles was compiled. Whenever possible, copies of publications were obtained, and about 350 other publications were recorded on microfilm. Many publications were translated into English. (See Commercial Fisheries Review, August 1949, page 23.)

The team inspected Japanese tuna canning and processing methods, and the Photo Division, 71st Signal Service Battalion, took moving pictures of tuna long-line fishing. Other fisheries also were observed and recorded.

In addition, the team obtained samples of fish gear, which include a model bait retainer, tuna long-line gear, a shackle of tuna gill net, and a blueprint of the spray system in use on the skipjack boats.



Pribilof Island Fur-Seal Take, 1949

A total of 70,891 fur-seal skins were taken this year in the Government-administered sealing operations on Alaska's Pribilof Islands, the Fish and Wildlife Service announced on August 25. This year's yield was 749 skins more than in 1948. The annual season for taking fur seals began on June 10 and continued on a daily basis from June 17 through July 27.

Two daily record kills were reported, one on July 22 with 5,329 skins (the largest kill in more than 60 years); the other on July 17 with 4,950 skins.

Under the provisions of the 1944 Alaska Fur-Seal Law, 20 percent of the annual take of skins become the property of the Canadian government. Approximately 60 percent of the world's fur seals come to the Pribilof Islands to breed.

The 1949 fur-seal census has not been reported but last year it was 3,837,000 animals. The seal population of the Pribilofs increased from a low of 132,000 animals in 1910 to its present size under Federal conservation and management.

After being dressed and dyed by a fur company in St. Louis, the furs are offered for sale at public auction, the net proceeds going to the Treasury of the United States.

Valuable byproducts of this year's fur-sealing are the 350 tons of fur seal meal, 14,000 gallons of carcass oil and 33,000 gallons of blubber oil. These products are made in a Government-operated plant on the Pribilofs and will also be offered at auction.

Pelagic sealing (the killing of seals while they are at sea) is prohibited by an international agreement between Canada and the United States. At one time pelagic sealing nearly brought about the extinction of the animals.



Production of Sponges at Tarpon Springs, Florida, 1948

During 1948, 12,000 bunches (approximately 72,616 pounds) of sponges, valued at \$465,938.02, were produced and sold over the Tarpon Springs Sponge Exchange, Inc., compared with 23,030 bunches (approximately 158,304 pounds), valued at \$1,741,883.03 in 1947. This was a considerable decline in production as well as value in 1948.

For many years the sponge industry of the United States was confined to the shoal waters of the Key Grounds (between the Florida Keys and the mainland), and Key West was the center of the sponge trade. However, with the exhaustion of these grounds and the introduction of machine diving in the deeper waters of the Bay Grounds (beginning near Johns Pass, a few miles north of Tampa Bay, and extending without material interruption as far as St. Marks), Tarpon Springs soon became the largest sponge market in the world, and in normal times about 90 percent of the United States sponge catch is landed there. Most of the catch is sold on the Tarpon Springs Sponge Exchange, a nonprofit organization established in 1908. Some of the sponges sold at Tarpon Springs are obtained by the hooking method, but most are taken by machine divers.



TARPON SPRINGS SPONGE EXCHANGE BUILDING

Reports indicate that in 1948 less than 70 boats were engaged in this fishery, compared with 200 boats operating prior to 1939. Because of the shortage of sponges, many of the diving boats have been converted for other types of fishing and some of the experienced divers are seeking other employment.

Production of Sponges at Tarpon Springs, Fla., Quantity (bunches and pounds) and Value, 1947-48								
Type of Sponge	1 9 4 8 ^{1/}				1 9 4 7 ^{2/}			
	Q u a n t i t y		Total Value	Avg. Price Per Lb.	Q u a n t i t y		Total Value	Avg. Price Per Lb.
	No. Bunches (est.)	Lbs. (est.)	\$	\$	No. Bunches (est.)	Lbs. (est.)	\$	\$
Rock Island Sheep's-Wool:								
Large	725	7,975	87,345.00	10.95	1,038	12,456	349,629.54	28.07
Extra-med., med., & small	906	6,342	69,364.58	10.94	2,245	15,715	310,550.85	19.76
Rags, large	1,367	12,303	109,944.48	8.94	12,426	99,408	977,926.20	9.84
" , extra-med., med., & small	5,585	33,510	167,335.41	4.99				
Total	8,583	60,130	433,989.47	7.22	15,709	127,579	1,638,106.59	12.84
Other:								
Yellow	1,182	3,546	12,864.73	3.63	2,640	11,220	45,390.11	4.05
Grass	2,235	8,940	19,083.82	2.13	4,681	19,505	58,386.33	2.99
Total	3,417	12,486	31,948.55	2.56	7,321	30,725	103,776.44	3.38
Grand Total	12,000	72,616	465,938.02	6.42	23,030	158,304	1,741,883.03	11.00
^{1/} Sales over the Tarpon Springs Sponge Exchange, Inc. (Approximately \$50,000 of sponges were sold outside the Exchange)								
^{2/} Consists of sales reported by the Tarpon Springs Sponge Exchange, Inc. and a sponge cooperative (cooperative did not operate in 1948).								



U.S. Imports of Fish Meal and Scrap, January-June 1949

The United States imports of fish meal and scrap for use in feeds and fertilizers during the first six months of 1949 amounted to 30,982 short tons, valued at \$4,523,387--an increase of 36 percent in quantity and 57 percent in value when compared with the corresponding period in 1948.

Canada was the leading shipper of fish meal and scrap, accounting for 60.6 percent of the January-June 1949 total imports, compared with 48.8 percent of the imports for the first half of 1948, and 64.1 percent of the imports for the year 1948.

U. S. Imports of Fish Meal and Fish Scrap, January-June 1949 and 1948, and the Year 1948																		
Country of Origin	Fish Meal and Fish Scrap for Feeds						Fish Meal and Fish Scrap for Fertilizers						C o m m o n T o t a l					
	Jan.-June 1949		Jan.-June 1948		12 Months-1948		Jan.-June 1949		Jan.-June 1948		12 Months-1948		Jan.-June 1949		Jan.-June 1948		12 Months-1948	
	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$
Canada	18,210	3,187,189	11,034	1,490,087	26,287	3,407,687	70	14,000	50	6,818	50	6,818	18,760	3,181,189	11,034	1,493,505	26,347	3,416,305
Newfoundland	3,056	285,500	1,537	102,911	2,923	204,454	-	-	-	-	-	-	3,056	285,500	1,537	102,911	4,593	204,454
Mexico	201	32,463	97	11,386	450	48,774	505	33,078	386	32,706	1,068	80,470	706	65,241	1021	104,092	1,918	185,346
Venezuela	200	11,502	438	49,599	601	63,405	64	7,301	-	-	-	-	204	23,703	436	49,559	601	63,405
Peru	414	35,641	-	-	55	2,670	1,017	58,410	496	27,456	456	27,466	1,431	54,631	496	27,466	501	50,336
Uruguay	10	2,623	-	-	-	-	-	-	-	-	-	-	10	2,623	-	-	-	-
Argentina	556	66,339	698	69,911	835	82,404	442	56,834	296	30,543	458	43,332	908	123,173	694	100,454	1,293	127,756
Iceland	-	-	4,505	612,073	4,505	612,073	-	-	3,186	443,905	3,186	443,905	-	-	7,651	1,005,978	7,651	1,005,978
France	564	70,345	-	-	-	-	-	-	-	-	-	-	564	70,345	-	-	-	-
Norway	1,500	233,798	-	-	28	4,547	-	-	-	-	-	-	1,500	233,798	-	-	28	4,547
Portugal	1,619	190,452	-	-	-	-	-	-	-	-	-	-	1,619	190,452	-	-	-	-
French Morocco	96	7,582	-	-	-	-	-	-	-	-	-	-	96	7,582	-	-	-	-
Portuguese Guinea	265	36,877	-	-	-	-	670	68,749	-	-	-	-	935	120,628	-	-	-	-
New Zealand	-	-	-	-	112	16,529	-	-	-	-	-	-	-	-	-	-	112	16,529
Union of South Africa	565	56,192	-	-	60	4,370	478	56,110	-	-	-	-	983	114,302	-	-	120	60
Totals	27,736	4,506,505	18,309	2,336,767	35,856	4,447,063	2,246	314,462	4,424	543,238	5,206	609,791	30,982	4,503,397	22,733	2,860,005	41,124	5,050,000



U.S. Pack of Canned Clams and Clam Products, 1948

The 1948 pack of canned clams and clam products amounted to 1,179,774 cases, valued at \$8,329,639 to the canners. This was a decline of 6 percent in the number of cases packed and 4 percent in value compared with the previous year.

Table 1 - Pack of Canned Clams & Clam Products, By Type of Product & By Area, 1948 (Quantity & Value to Canners)

Product, State and Number of Plants	Whole and Minced			Chowder, Juice, Broth, & Nectar			Total	
	Std. Cases	Avg. Price per case	Total Value	Std. Cases	Avg. Price per case	Total Value	Std. Cases	Value
Soft Clams:								
Maine (12)	107,177	\$10.25	\$1,098,863	166,521	\$5.68	\$ 945,204	273,698	\$2,044,067
Razor Clams:								
Washington (4)	9,393	17.17	161,312	-	-	-	9,393	161,312
Alaska (11)	27,539	17.95	494,402	-	-	-	27,539	494,402
Total razor clams	36,932	17.75	655,714	-	-	-	36,932	655,714
Hard Clams: 1/								
Mass. (1), R.I. (1), N.Y. (6)	19,332	8.53	164,843	67,072	5.33	357,631	86,404	522,474
N.J. (1), Pa. (1), Md. (1) ..	-	-	-	770,685	6.47	4,989,857	770,685	4,989,857
Wash. (4)	9,679	11.23	108,684	2,100	3.26	6,856	11,779	115,540
Alaska (1)	74	18.65	1,380	202	3.00	607	276	1,987
Total hard clams	29,085	9.45	274,907	840,059	6.37	5,354,951	869,144	5,629,858
Grand total (43)	173,194	11.72	2,029,484	1,006,580	6.26	6,300,155	1,179,774	8,329,639

1/Includes the pack of surf clams in New York.

Note: "Standard cases" represent the various-sized cases converted to the equivalent of 48 No. 1 cans, each can of whole and minced clams containing 5 ounces of meat, drained weight; and each can of chowder, juice, broth, and nectar, 10 ounces, net weight.

The pack of whole and minced clams amounted to 173,194 standard cases (2,597,910 pounds, drained weight, of clam meats), valued at \$2,029,484, while the production of clam chowder, juice, broth, and nectar totaled 1,006,580 standard cases (30,197,400 pounds net weight), valued at \$6,300,155.

The production of canned whole clams totaled 61,850 standard cases, valued at \$760,126; minced clams, 111,344 standard cases, valued at \$1,269,358; clam chowder, 983,584 standard cases, valued at \$6,219,480; and canned clam juice, broth, and nectar, 22,996 standard cases, valued at \$80,675.

Table 2 - Pack of Canned Clams & Clam Products, By Type of Product, 1939-48 (Quantity & Total Value to Cannery)						
Year	Whole and Minced			Chowder, Juice, Broth, and Nectar	T o t a l	
	Soft Clams- Std. Cases	Hard Clams Std. Cases	Razor Clams Std. Cases			
1948	107,177	29,085 ²	36,932	1,006,580	1,179,774	\$ 8,329,639
1947	33,968	24,863	47,407	1,151,424	1,257,662	8,642,235
1946	167,987	108,638	79,394	1,171,770	1,527,789	11,145,047
1945	64,425	238,475	63,703	533,429	900,032	7,391,098
1944	72,434	71,771	40,450	363,041	547,696	3,820,612
1943	47,746	28,344	40,340	348,364	464,794	2,802,420
1942	72,499	30,515	40,104	639,484	782,602	3,791,058
1941	97,460	32,303	40,192	757,388	927,343	3,711,029
1940	124,697	38,851	74,565	689,515	927,628	3,778,363
1939	117,602	42,056	76,315	699,174	935,147	3,798,319

1/ The production of canned surf clams in Maine has been included with the pack of soft clams.
2/ Includes pack of surf clams in New York.



U.S. Pack of Canned Crab Meat, 1948

The 1948 pack of canned crab meat amounted to 220,802 standard cases, valued at \$4,846,494 to the canner, an increase of 58 percent in volume and 79 percent in value compared with the previous year. The 1948 pack was the largest in history, exceeding the previous record (established in 1946) by nearly 22,000 cases. The increase in production occurred on the Pacific Coast where the pack totaled 187,420 cases, a gain of over 81,000 cases compared with the previous year. Crab meat for canning was obtained from three species of crabs in 1948--

Table 1 - Pack of Canned Crab Meat, By State & Species, 1948 (Quantity & Value to Cannery)				
State	Species of Crab Used	Std. Cases	Avg. Price Per Case	Total Value
Md., N. & S. Carolina, Co., Ala., & Miss.	Blue	18,862	\$19.15	\$ 361,200
Louisiana	Blue	14,520	15.20	220,672
Washington	Dungeness	104,362	22.00	2,295,905
Ore. & Calif.	Dungeness	56,982	23.49	1,338,349
Alaska	Dungeness	8,454	22.04	186,368
	King	17,622	25.20	444,000
Total		220,802	21.95	4,846,494

Note: "Standard cases" represent the various-sized cases converted to the equivalent of 48 cans to the case, each can containing 6½ ounces of crab meat.

Table 2 - Pack of Canned Crab Meat, By Size of Can & Container, 1948 (Quantity & Value to Cannery)			
Can. & Case Size	Actual Cases	Avg. Price Per Case	Total Value
6½ ounces (48 cans) ..	188,429	\$22.52	\$4,243,071
6½ ounces (24 cans) ..	1/61,234	9.08	1/556,072
13 ounces (24 cans) ..	1,079	24.00	25,896
3½ ounces (48 cans) ..	1,355	15.83	21,455
Total	252,097	-	4,846,494

1/ Includes a small pack of 5-ounce cans, packed 24 to the case.

Pacific Coast Dungeness crabs (169,798 cases), Atlantic Coast blue crabs (33,382 cases), and Alaska king crabs (17,622 cases).

Crab meat was canned in 6 plants in Louisiana, 21 in Washington, 9 in Oregon, 10 in Alaska and 1 plant each in Maryland, North Carolina, South Carolina, Georgia, Alabama, Mississippi and California.

Table 3 - Pack of Canned Crab Meat, 1939-48 (Quantity & Value to Cannery)

Year	Atlantic Coast and Gulf States			Pacific Coast States and Alaska			T o t a l		
	Std. Cases	Avg. Price Per Case	Total Value	Std. Cases	Avg. Price Per Case	Total Value	Std. Cases	Avg. Price Per Case	Total Value
1948	33,383	\$17.43	\$581,872	187,420	\$22.75	\$4,264,622	220,802	\$21.95	\$4,846,494
1947	33,696	19.81	667,487	106,120	19.20	2,037,904	139,816	19.35	2,705,391
1946	120,150	21.11	2,536,405	78,928	27.67	2,183,714	199,078	23.71	4,720,119
1945	29,788	16.28	484,869	25,726	15.51	398,898	55,514	15.92	883,767
1944	36,386	15.41	560,735	50,556	15.84	800,723	86,942	15.66	1,361,458
1943	26,716	15.43	412,310	48,592	16.10	782,173	75,308	15.86	1,194,483
1942	29,656	13.41	397,772	84,892	15.99	1,357,293	114,548	15.32	1,755,065
1941	22,494	10.48	235,745	37,704	8.27	311,872	60,198	9.10	547,617
1940	13,486	9.70	130,869	25,254	7.05	178,021	38,740	7.97	308,890
1939	9,728	7.76	75,502	23,100	7.98	184,254	32,828	7.91	259,756



U.S. Pack of Canned Salmon, 1948

The 1948 pack of canned salmon in the Pacific Coast States and Alaska amounted to 4,824,966 standard cases, valued at \$120,537,196 to the cannery. Compared with

Table 1 - Pack of Canned Salmon, 1948, by Species and Area (Quantity & Value to Cannery)

Species	A l a s k a			Pacific Coast States			T o t a l		
	Std. Cases	Avg. Price per case	Total Value	Std. Cases	Avg. Price per case	Total Value	Std. Cases	Avg. Price per case	Total Value
Chinook or King ...	53,959	\$28.92	\$1,560,674	285,266	\$35.75	\$10,197,153	339,225	\$34.66	\$11,757,827
Chum or keta	781,888	20.33	15,896,244	276,158	15.26	5,319,477	1,058,046	20.05	21,215,721
Pink	1,304,480	22.65	29,541,982	4,480	26.04	116,651	1,308,960	22.66	29,658,633
Red or sockeye	1,639,902	26.55	43,533,904	97,907	41.70	4,082,685	1,737,809	27.40	47,616,589
Silver or coho	234,313	25.55	5,987,786	125,647	28.81	3,620,257	359,960	26.69	9,608,043
Steelhead	349	23.32	8,140	20,617	32.61	672,243	20,966	32.45	680,383
Total	4,014,891	24.04	\$96,528,730	810,075	29.64	\$24,008,466	4,824,966	24.98	\$120,537,196

Note: "Standard cases" represent the various-sized cases converted to the equivalent of 48 one-pound cans (each can containing 16 ounces).

1947, this was a decline of 14 percent in volume, and 0.1 percent in value. Alaska accounted for 84 percent of the 1948 pack; Puget Sound, 9 percent; the Columbia River districts of Washington and Oregon, 7 percent; and the coast areas of the Pacific Coast States, 1 percent.

Table 2 - Pack of Canned Salmon, 1939-48 (Quantity & Value to Cannery)

Year	A l a s k a			Pacific Coast States			T o t a l		
	Std. Cases	Avg. Price per case	Total Value	Std. Cases	Avg. Price per case	Total Value	Std. Cases	Avg. Price per case	Total Value
1948	4,014,891	\$24.04	\$96,528,730	810,075	\$29.64	\$24,008,466	4,824,966	\$24.98	\$120,537,196
1947	4,312,286	20.56	88,669,542	1,329,226	24.05	31,969,134	5,641,512	21.38	120,638,676
1946	3,949,878	13.46	53,157,194	560,289	30.35	17,003,459	4,510,167	15.56	70,160,653
1945	4,350,471	10.26	44,644,303	557,769	14.24	7,942,102	4,908,240	10.71	52,586,405
1944	4,893,059	10.46	51,196,140	245,588	21.12	5,187,136	5,138,647	10.97	56,383,276
1943	5,428,318	10.65	57,824,267	275,889	18.53	5,110,847	5,704,207	11.03	62,935,114
1942	5,075,974	9.52	48,300,209	759,032	18.02	13,673,968	5,835,006	10.62	61,974,177
1941	6,932,040	8.11	56,217,601	899,589	12.45	11,199,317	7,831,629	8.61	67,416,918
1940	5,069,343	6.21	31,474,492	535,663	12.27	6,575,176	5,605,006	6.79	38,049,668
1939	5,263,161	6.54	34,441,122	728,943	10.07	7,339,727	5,992,104	6.97	41,780,849

Salmon were canned in 35 plants in Washington, 14 in Oregon, 4 in California, and 123 in Alaska.



WHOLESALE AND RETAIL PRICES

The wholesale index for all foods, which for the past two months had risen slightly, again started to decline and on August 16 was 161 percent of the 1926 average--1.9 percent less than on July 19 this year and 15.7 percent below August 17, 1948, according to the Bureau of Labor Statistics of the Department of Labor.

Wholesale and Retail Prices				
Item	Unit	Percentage change from--		
<u>Wholesale: (1926 = 100)</u>		<u>Aug. 16, 1949</u>	<u>July 19, 1949</u>	<u>Aug. 17, 1948</u>
All commodities	Index No.	151.9	-1.6	-10.6
Foods	do	161.0	-1.9	-15.7
<u>Fish:</u>		<u>Aug. 1949</u>	<u>July 1949</u>	<u>Aug. 1948</u>
Canned salmon, Seattle:				
Pink, No. 1, Tall	\$ per doz. cans	4.802	+5.4	-13.7
Red, No. 1, Tall	do	6.008	+6.1	- 9.0
Cod, cured, large shore, Gloucester, Mass.	\$ per 100 lbs.	15.500	0	+ 6.9
<u>Retail: (1935-39 = 100)</u>		<u>Aug. 15, 1949</u>	<u>July 15, 1949</u>	<u>Aug. 15, 1948</u>
All foods	Index No.	202.6	+0.4	-6.5
<u>Fish:</u>				
Fresh, frozen and canned	do	308.9	+0.4	+1.5
Fresh and frozen	do	254.4	+1.3	0
Canned salmon:				
Pink	c per lb. can	56.9	-1.2	+4.0

Canned salmon wholesale prices increased substantially in August. Canned pink salmon prices were 5.4 percent higher in August than in July this year, but were still 13.7 percent below August 1948. Canned red salmon prices were 6.1 percent over July this year, but were still 9 percent below August a year ago.

Average retail food prices increased slightly and were 0.4 percent higher on August 15 this year compared with the previous month, but 6.5 percent below August 15, 1948. The retail fresh and frozen fish index increased 1.3 percent over mid-July this year and was equal to mid-August 1948. The combined fresh, frozen and canned fish index was 0.4 percent above mid-July 1949 and 1.5 percent higher than in mid-August 1948.





Australia

THE WHALING INDUSTRY ACT 1949: The "Whaling Industry Bill 1949" was introduced in the Australian Parliament on May 20, 1949, and after passage by both Houses, received Royal Assent and became law on July 12. This permits the Government to establish a shore station for whaling in Australia, according to a July 20 report from the American Embassy at Canberra.

The Bill provides for the establishment of a whaling commission consisting of a chairman, a deputy-chairman, and one other member, to be appointed by the Governor General. The Commission will have very broad powers, its functions being:

1. To engage in whaling in Australian waters
2. As an aid to the economic and stable operation of its whaling activities in Australian waters, to employ in whaling in the vicinity of any Australian waters, vessels not required for the time being for whaling in Australian waters

The Commission is empowered to maintain and operate chaser ships, shore bases and factory ships, to process whales, manufacture any product derived from whales, and to sell either the whales or products derived from them. There are also a number of incidental powers, such as the right to lease, charter, purchase and sell ships, and to use such ships in foreign or coastal trade when they are not needed for whaling. (Also see Commercial Fisheries Review, August 1949, page 31.)



Bizone Germany

CUTTER FISHERIES: While steam trawlers now catch most of the sea fish consumed in Germany, the so-called high-seas and coastal cutters are also of importance, according to an August 2 American consular report from Bremerhaven. In 1938, for example, cutters landed about 15 percent of the total German catch of sea fish of over 700,000 metric tons; in 1948, the cutter's share amounted to 22 percent of a total German catch of 373,000 tons. The place of the cutter as a supplier of quality fish to a free, well-balanced market is shown by the fact that the average price for cutter-caught fish in 1938 was 137 percent of the average price for trawl fish in the same year.

The German fishing industry classifies fishing vessels into 3 major types: trawler (fischdampfer), logger, and cutter.

The cutter is distinguished from the other two types by its smaller size and by its use of a sail as an auxiliary means of propulsion and as a means of maintaining stability when heaving the net. Two classes of cutters are recognized.

The high-seas cutter (hochseekutter) is at least 52 feet in length. A common type of high-seas cutter is the 65.6 feet, 120 h.p. "KFK" cutter, built during the war by the German Navy to serve as a minesweeper, taken over after the surrender by the occupying powers, and subsequently turned back under various arrangements to the German economy for refitting as a fishing craft. A 5- to 7-man crew is carried. Such a vessel usually makes trips of not more than 12 days, but has at times gone to the fishing grounds off Iceland and has remained at sea as long as 20 days. In 1938, 173 high-seas cutters were in operation in all Germany; at the end of 1948, 417 were registered in Western Germany. The 92 United States-owned and 118 United Kingdom-owned KFK cutters largely account for the increase in the cutter fleet.

The coastal cutter (kustenkutter) is less than 52 feet in length. A typical one is 32.8 feet long, has a 40 h.p. diesel engine, and a crew of 2. Coastal cutters fish in rivers or occasionally in the waters around the Frisian Islands and remain out of port for 24 hours. Before the war, about 10,500 coastal cutters were registered in all of Germany; it is estimated that about 5,000 now are in use in the British and American zones.

The cutter fishers are now experiencing a financial crisis. From April through July this year, the ex-vessel prices for cutter fish have dropped along with the prices for trawl fish. Since the cutters for the most part are owned or chartered by individual operators who have little accumulated capital, the cutter fisher has felt the effect of continued low prices more quickly than the trawl fisher. The Land Bremen Fisheries Administration has estimated that cutter fishers are in debt \$900-\$4,500.

Among those fishers who have chartered United States-owned KFK cutters from the Fischdampfer Treuhand, a certain amount of ill-will towards the United States has arisen. In their minds, the United States seems to be playing the role of Shylock, demanding high charter fees and insurance premiums at a time when fish prices have dropped so much that they can hardly cover their operating expenses. The truth of the matter is that the United States did turn over the cutters to the Fischdampfer Treuhand without compensation and receives nothing from the charter fees or insurance premiums. The cutter charter fees, 10 percent of the ship's catch or a minimum of \$1,500 per year, were set by the Fischdampfer Treuhand as the minimum needed to amortize in 15 years or less the cost of converting the minesweepers to fishing craft. The United States has required that the cutters be insured at full replacement value, but this insurance is written by German companies. And to further refute the idea that the United States is driving the KFK cutter fisher into debt, it should be noted that the KFK cutters can be turned back to the Treuhand if the charterer so desires.

Most charterers have held the replacement value of the cutters for insurance purposes to be too high. The conversion costs also are thought to have been too high, especially in view of the fact that the KFK cutter has a hull made of soft and not too durable wood. Although the United States retains title to all improvements and repairs made to the cutters, no one in Bremerhaven fisheries circles expects the United States to take the boats back and consequently no one accuses the United States of having had costly repairs for its benefit made at the expense of the charterers.

In contrast to the proceedings in the American zone, the British had the cost of converting the 118 KFK cutters which fell to them as war booty charged to the occupation. Consequently, the charterers of fishing craft from the British do not bear the same amortization burden as do their American zone counterparts.

That the cutter fishery now is facing a financial crisis is evident. Because of the greatly increased number of high-seas cutters presently in operation as compared with 1938, the advisability of attempting to mitigate the effects of the economic forces at work is questionable. It would seem that sooner or later, the ratio of trawler landings to cutter landings will have to rise at least to the pre-war value, caused partly by an increase in the size and number of trawlers and largely by a decrease in the number of cutters. The disposition of the 92 KFK cutters owned by the United States after the vessels have ceased to have any value as fishing craft is a matter still to be faced.

* * * * *

FIRST U. S. FISHING TRAWLERS ARRIVE: The first 5 of the 12 trawlers purchased in the United States by OMGUS for use by the German fishing industry have arrived in Bremerhaven, according to a July 26 report from the American Consulate at Bremerhaven. The purchase of these ships by the United States has not met with universal approval in Bremerhaven fisheries circles. The rapid improvement in the German food supply starting in the spring of 1949 has decreased the demand for fish so much that it is not possible to market at a profitable price all fish brought in by the present fleet. Some of the less economic trawlers have had to be withdrawn from service. Under these conditions, ship owners are inclined to move cautiously in accepting new vessels and especially so when these new vessels have features never before used in a German trawler.

It was first planned to distribute the ships strictly in proportion to war losses suffered. This plan has not been held to for several reasons, one being the reluctance on the part of the largest companies to take over any of the vessels. Also, the GHG (Gemeinwirtschaftliche Hochseefischerei Genossenschaft), the union-sponsored trawler-owning corporation, is to be given 2 of the 12 ships on charter, although having been founded after the war, it suffered no war losses whatsoever. Of the remaining 10 ships, 5 are to be chartered to small Bremerhaven firms, 2 to Cuxhaven firms, 2 to Hamburg firms, and 1 to a Kiel firm.

Because the new trawlers are constructed along lines differing from German trawlers, certain conservative elements have opposed accepting them. Old-time fish-



NEW ENGLAND-TYPE LARGE TRAWLER PURCHASED IN THE UNITED STATES BY THE U. S. ARMY FOR USE BY THE GERMAN FISHING INDUSTRY.

ing vessel personnel, familiar only with steam propulsion, do not relish the introduction of diesel propulsion, and have belittled the new trawlers. Since the German fishing vessels remain at sea longer than is customary in the United States, the quarters for the crew on the new trawlers are considered by the Germans to be sub-standard. It is customary in the German fishing fleet to clean the catch and to extract the livers at sea. For this purpose a special room is needed where the livers may be chopped up, cooked, and where the oil can be separated. No provision for such an installation was made in the Amer-

ican-built trawlers. The small size of the new trawlers (average capacity 3,500 baskets of fish) furnishes another ground for complaint, as the local fishing companies prefer much larger vessels.

Certain features of the trawlers have met with approbation by unbiased experts, such as the low oil-consumption, the refrigerated storage space, the recording

marine sounder, and the good condition in which they arrived. However, even if the vessels were well suited to German conditions, and no spare parts problem existed, the wisdom of bringing them to Germany is questionable, since the average cost (\$270,000) is little, if at all, under the cost of building a new trawler of the recent German 400-ton series.



Canada

NEW SEINER-PACKERS LAUNCHED ON WEST COAST: Typical of the continued development in the type of vessels participating in Canada's fisheries are the several new boats now in operation on the British Columbia coast, according to the August 1949 Trade News of the Canadian Fisheries Department.

Recently, five vessels of the seiner-packer type were launched in the Vancouver area.

Three of these were built at a cost of about \$55,000 each, and are designed for both salmon and herring fishing.

One of these vessels has a length of 64 feet and a beam of 17 feet; a 150 h.p. main Diesel engine with a speed of 11 knots; a registered tonnage of 47 tons, a gross of 59 tons; and accommodation for eight berths. The vessel's seine table, winch, and anchor are driven by hydraulic power, while auxiliaries are used for the 32-volt lighting plant, air, and water pumps.

The two others are 65 feet in length, with beams of 17 feet; seiner-packer type; 150 h.p. Diesel capable of 10.25 knots; gross tonnage of 54 tons and registered tonnage of 37 tons; accommodations for eight berths; auxiliary power operates each vessel's 32-volt lighting plants, air and water pumps; and both are equipped with 50-watt radio transmitters.



Denmark

DANISH FISHING IN BARENTS SEA: During the summer of 1948, a Danish fishing vessel conducted experimental fishing (the first into these waters) for plaice and flounder in the Barents Sea, according to a May 23 report from the American Embassy at Copenhagen. Results were highly satisfactory, and the vessel brought home a catch valued at approximately \$8,335.

This year five Danish ships visited the same area. All are modern fishing vessels of postwar construction and of 50 to 60 gross registered metric tons. On May 8, 1949, four of the ships reported by radio that they expected to land their catches in Aberdeen, Scotland within a few days. The radio reports further stated that each ship would bring in from 25 to 30 metric tons of frozen flounder tentatively valued at \$10,419. The grounds are located, about 220 nautical miles southeast of Vardo, Norway, and about 50 miles beyond the Russian maritime jurisdiction. The most effective equipment was the Danish seines (trawls were tried but found to be unsuited to that particular type of sea bed).

The Faroe Islanders are known to fish the Barents Sea for cod, and although little information is available concerning their methods and catches, it is believed they employ the trawl.

The captain of one of the vessels considered the expedition highly successful for all vessels engaged in it, and he predicted that "several hundred" Danish fishing vessels would sail for the Barents Sea next year.

Such a development will offer new incentive to the Danish fishing industry. However, the Danish market will hardly be able to absorb any considerable increase in fisheries products, either in direct consumption or in the canneries. But possible markets such as England and Western Germany, are near at hand, depending, of course, upon import policies adopted by these countries.



Ecuador

INTERPRETATION OF TERRITORIAL WATERS: With regards to territorial waters, Article 582 of the Ecuadoran Civil Code states:

"The water adjoining the Ecuadoran coast seaward for a distance of one marine league—measured from the water line at lowest tide is territorial sea and under national domination; but the right of policing these waters for matters concerning the safety of the nation and for observance of fiscal laws extends seaward for four marine leagues measured in the same manner."

Ecuador interprets its law to mean that its territorial waters extend 12 miles from the western-most extension of the mainland, which is the peninsula of Santa Elena, according to a July 28 report from the American Embassy at Quito. The same interpretation is applied to the waters surrounding the Galapagos Islands.

1/ A marine league is equivalent to 3 nautical miles, or 20 to the degree (one degree equals 111.111 meters).



Egypt

REVIEW OF THE FISHERIES: The sources of Egypt's fish supply are a coastline of more than 1,500 miles, lakes having an area of some 1,000,000 acres, and the Nile River and its tributaries, according to an American consular report from Cairo. The fisheries of Egypt have not yet been extensively developed; however, the Egyptian Government is studying modern techniques in fishing, preservation, and processing, and plans are being developed to improve and expand the industry.

It is roughly estimated by Egyptian Fisheries Department officials that 40,000 metric tons of domestic fishery products are consumed annually in Egypt. Of this total, 25 percent represents the marine catch along the Mediterranean and the Red Sea; 60 percent, lake production; and 15 percent, that taken from the waters of the Nile and its tributaries. The Red Sea fishing grounds furnish about 4,000 metric tons of the marine total, with a value at landing points of \$826,600.

Egypt imports over 10,000 tons of fishery products from all sources, and exports (principally in the form of supply to ships' stores) between 500 and 600 tons. Note: Values converted on the basis of 1 Egyptian pound equals \$4.133 U. S.

* * * * *

SPONGE FISHERY, 1949: The sponge fishing season starts in May and ends in November of each year in Egyptian waters. Because of litigations between the Egyptian and Greek sponge fishing interests, the production during the 1947 season was only fair, and was even less in 1948. By January 1949, all stocks on hand in December 1948 were sold, according to a July 18 report from the American Consulate General at Alexandria. .

Early in May 1949 an agreement was signed between the Egyptian sponge company (sole holder of all Egyptian Government permits to fish sponges in Egyptian waters) and the Greek Minister of Foreign Affairs. The Egyptian Government granted the Egyptian sponge company 5 more fishing permits, which brings the fishing permits to a total of 20 instead of 15 (18 of these were given to Greek fishers, i.e., 17 sailing vessels carrying crews equipped with diving suits and 1 vessel carrying a crew of 80 without diving equipment; 2 permits were reserved for Egyptian fishers).

Sponge fishing started on June 23, 1949, with a total of 45 fishing boats and a complement of 560 greek fishers and 90 Egyptians. It is stated that the Egyptian sponge company has already sold 70 percent of its share of the 1949 total sponge production to the Greek captains of the sponge fishing fleet.

It is estimated that the production will be about 44,000 pounds, divided as follows:

Honeycomb.....	33,000 pounds
Turkey cup.....	8,800 pounds
Zimocca.....	2,200 pounds



Gambia (British West Africa)

STATUS OF THE FISHERIES: In an effort to increase the catch of sharks and to experiment with deep-sea fishing for the purpose of augmenting the Gambian diet, a fishing vessel ordered from the United Kingdom was expected to arrive during July 1949. It will be suitable for fishing some 40 to 50 miles at sea. Byproducts of the catch will be used as feed for poultry in the form of ground bones and fish meal, according to a June 20 report from the American Consulate General at Lagos, Nigeria.

Sharks are plentiful off the coast of Gambia, and exports of some 2,500 pounds of livers to the United Kingdom are expected this year. The meat of the shark is sun-dried for eating, most of it being shipped to neighboring French Senegal because the Gambians do not like it. Each year about half a ton of shark fins are exported to China to be used in soup.

Most of the fishing is done from native canoes with nets, the annual catch being about 1,000 metric tons. It is believed that the catch could easily be doubled as there is no evidence of overfishing.

Greece

Sponge Fishery and Market, 1948: Fishing Fleet: According to the Greek Inspector of Fisheries, Ministry of National Economy, the 1948 sponge fishing fleet consisted of approximately 250 fishing boats of all types and sizes and 80 auxiliary boats, or 330 vessels of all kinds. The number of divers and crew members was 3,526—divers, 1274; sailors, 1,652; auxiliary boat crews, 600. This is a slight reduction in the number of boats, and a considerable reduction in the number of men, compared to 1947, according to a May 4 report from the American Embassy at Athens. This reduction is probably due to

1. The long delay in getting the Greek sponging fleet equipped and launched in 1948;
2. the large stocks of sponges on hand from the 1947 harvest;
3. the conditions under which fishing licenses were issued Greek spongers by the British authorities in the former Italian colonies in North Africa, which may have discouraged some sponge fishermen; and
4. the fact that the 1947 figure of 4,200 men engaged in the sponge fishery may have included not only divers and the crews but also persons engaged in sponge processing on shore.

1947 Harvest: The 1947 sponge harvest, which the Greek trade estimated would reach 450,000 pounds, was originally reported as 331,000 pounds, but according to the Inspector of Fisheries actually amounted to 352,700 pounds. The latter is a revised figure.

1948 Harvest: Due mainly to the two months' delay in the sailing of the sponge fishing fleet, the 1948 harvest produced only between 309,000 and 320,000 pounds (Table 1).

The 1948 harvest consisted of 286,594 pounds of honeycomb; 11,027 pounds of Turkey cup and Turkey toilet; 11,023 pounds of zimocca and elephant's ear; and 11,023 pounds of Grade D and scrap, distributed throughout all species collected. Around 209,000 pounds of the honeycomb were collected off Cyrenaica; 77,000 pounds were collected from Greek waters. The Turkey-cup and Turkey-toilet catch was unusually

small because unfavorable restrictions placed on Greek sponge fishers by the Egyptians discouraged Greek fishing in Egyptian waters. Greek sponge fishermen were

Grade of Sponges	Lbs.
A	176,368
B	88,184
C	44,092
D and other	11,023
Total	319,667

Table 2 - Average Prices for Bengazi Honeycomb Sponges, 1947-48¹

Grade	Price	
	1948	1947
	Per Lb.	Per Lb.
A	\$15.88	\$16.00-\$17.00
B	9.07	9.00- 10.00
C	5.45	4.50- 5.00

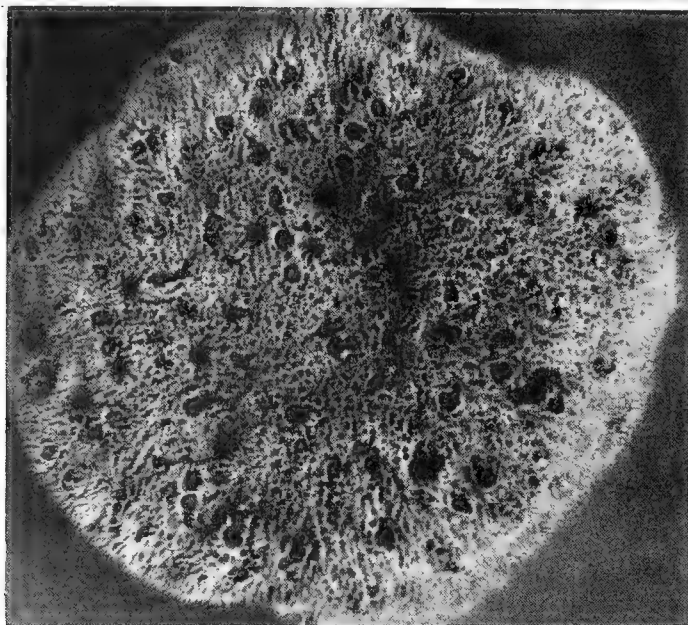
¹/All prices are quoted f.o.b. Greek port.

prohibited from working in the Tripolitania waters during 1947, and permission was granted in 1948 only after considerable delay. The small zimocca and elephant's ear catch is said to have been due to the fact that only three Greek boats fished sponges in the Tunisian waters during 1948.

Prices: The average price differed only slightly from prices in 1947 (Table 2).

Turkey cup and Turkey toilet averaged between 10 and 12 percent higher than Bengazi honeycomb; zimocca and elephant's ear, about the same; and Greek honeycomb, from 8 to 10 percent less than Bengazi honeycomb.

The prices of grade D and scrap sponges were approximately one-half the price of the preceding grade, and prices varied according to the degree of damage done the sponges during or subsequent to their harvest—usually being about one-half the difference between their original grade price and the price of the next lowest grade in the same species, but closer to the price of the original grade.



ZIMOCCA SPONGE SPECIMEN FROM MEDITERRANEAN SEA (TOP VIEW)

Market: The local demand for sponges is nil; probably due to the fact that sponges are one of the few badly needed export items of Greece, and the merchants hold them for this source of foreign exchange rather than attempting to attract any large domestic demand. The chief buyer of Greek sponges has, since World War II, become the United States. (Table 3).

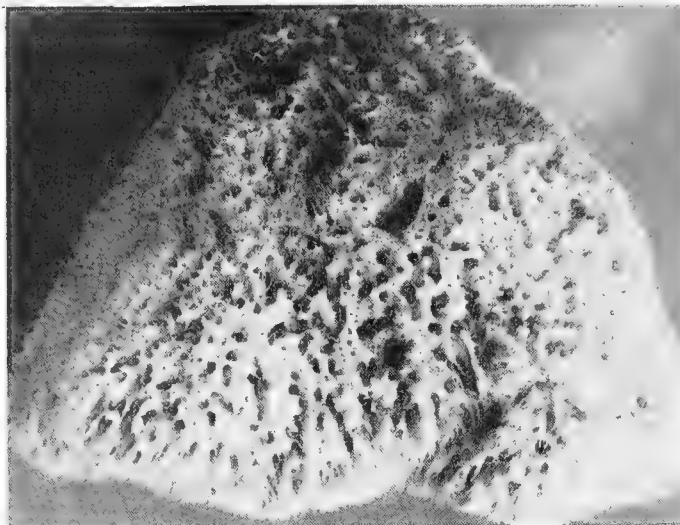
Stocks on Hand: There were reported to be 198,000 pounds of sponges on hand as of December 31, 1947. However, all 1948 exports of sponges were from the 1947 harvest. It would appear, therefore, that there were around 142,800 pounds of the 1947 catch still unexported as of December 31, 1948. This balance of the 1947 crop, plus the entire 1948 catch, would show a balance on hand as of the close of 1948 of between 452,000 and 462,000 pounds. This exceptionally high figure for stocks on hand as of December 31, 1948 is unrealistic. Export figures quoted were obtained from the Greek Customs Administration, and do not reflect the quantities of sponges that have already been sold, but not yet delivered, or quantities on which trade bargaining had been opened but not yet consummated at the time these data were compiled by Customs. The export statistics quoted above probably do not reflect certain stocks now being held in anticipation of their exchange for commodities under barter agreements made, or under negotiations, with various European countries. Actual stocks on hand, unconsigned and not otherwise earmarked, according to the Inspector of Fisheries, are so small as to have negligible economic importance.

Country of Destination	Quantity	Value
	Lbs.	\$
United States	18,457	203,588
Germany	4,636	87,526
United Kingdom	6,219	55,954
Italy	6,539	36,240
Czechoslovakia	3,274	34,770
Belgium	4,134	33,252
Canada	2,449	30,304
Sweden	2,771	22,522
Other countries	6,713	76,408
Total	55,192	580,564

Outlook for 1949: It was the opinion of the Inspector of Fisheries and other sources consulted that the 1949 sponge harvest would be the same as that for 1947 (close to 352,000 pounds). Greek sponges, in spite of their high prices, will

to be in demand throughout the world because of the various measures taken by Greek sponge merchants to safeguard the favorable position of Greek sponges on the world market.

The sponge fishing season extends from April through September in the Mediterranean area, and a large number of Greek fishing boats are reported to have set out for the sponge beds along the northern coast of Africa in pursuit of the 1949 sponge harvest. There is no reliable estimate yet available of the number of boats and men engaged in Greek sponge fishing activities this season, but the industry got under way approximately two months earlier than it did last year.



ZIMOCCA SPONGE SPECIMEN FROM THE MEDITERRANEAN SEA
(SIDE VIEW).



Iceland

1947 BUDGET CONTINUES TO PROVIDE FOR PAYMENT OF FISHERIES SUBSIDIES: The Icelandic Minister of Finance (in a speech delivered in the Althing prior to the passing on May 17 of the national budget bill for 1949) stated, with reference to fisheries, that during the last few years, the motorboat fishing industry was going heavily into debt primarily because of poor herring runs.

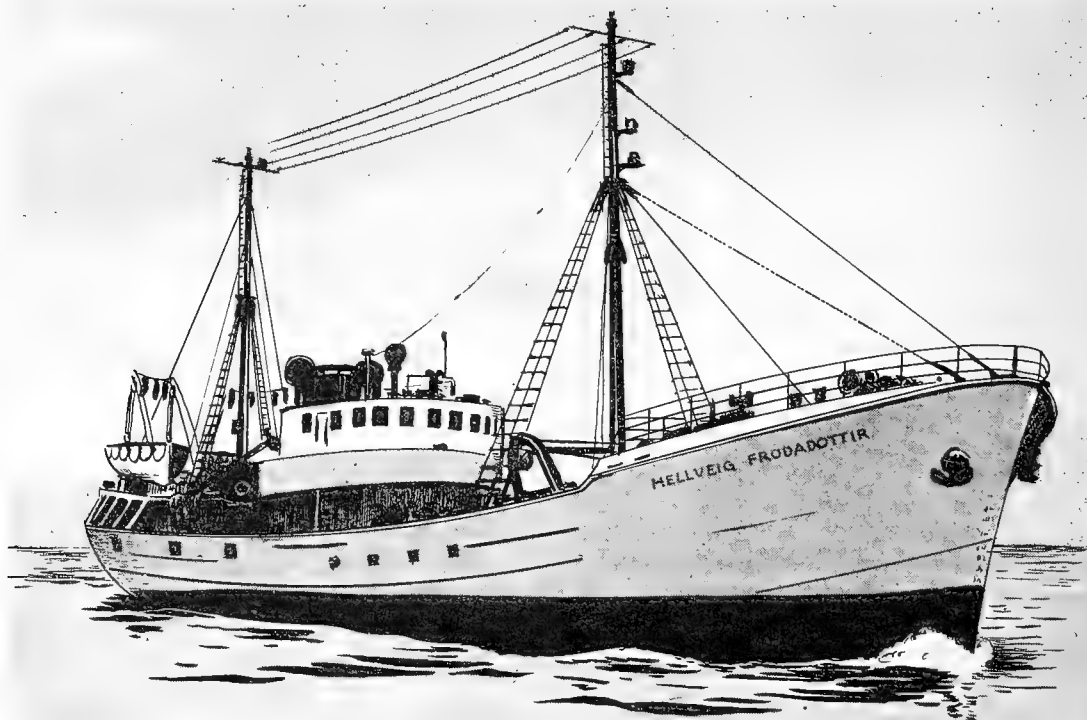
To maintain the motorboat fleet in operation, financial assistance was required and provided for in the Anti-Inflationary Act passed in December 1948. The law provided for a guaranteed price on deliveries of fresh fish to the factories and on exports of frozen fillets and salt fish. It also provided for the creation of a State Inflation Fund, the proceeds of which are to be utilized in rendering financial assistance to the fishing industry. (See Commercial Fisheries Review, February 1949, p. 45, and March 1949, p. 53.)

The present budget bill is an attempt to bring the budget as close to balance as possible. However, a general lowering of world prices of frozen fillets and salt fish may compel the Government to increase payment of subsidies on these exports. The Government's financial situation will depend to a great extent on the outcome of this year's summer herring catches, which to date have been very poor.

* * * * *

TO BUILD TEN NEW TRAWLERS: On July 8, 1949, the British Minister of Finance signed an agreement whereby a London bank will extend to the Icelandic Government a loan (stock certificate) amounting to 1,250,000 pounds sterling (approximately \$5,037,500), according to a July 25 report from the American Legation at Reykjavik.

This is the first foreign government loan permitted by the British Government since World War II. The proceeds of the loan will be used to cover almost the entire cost of constructing 10 new Icelandic trawlers contracted for in the United Kingdom. The actual cost of the trawlers is estimated to be approximately \$6,045,000 and they will be completed during December 1950-September 1951. The effective rate of interest on the loan will amount to approximately 5 percent; the nominal rate, $4\frac{1}{2}$ percent. The loan runs for a period of 20 years. Payment of annuities will commence in 1953. In order to meet the yearly payments, a portion of the earnings of the new trawlers is to be set aside. Priority to purchase trawlers will be extended to Icelandic municipalities and corporations rather than to individuals.



ONE OF A NUMBER OF TRAWLERS BUILT IN BRITAIN FOR ICELAND IN 1948-49. HAS SEVERAL OUTSTANDING FEATURES INCLUDING ALUMINUM FISH HOLD.

The agreement concerning the loan was worked out in June 1949. The British Government approved the extension of the loan to Iceland. The Icelandic Parliament (Althing) likewise sanctioned the loan by the passage of appropriate legislation. Final details and formalities were worked out in Reykjavik where the agreement was signed.

Several Icelandic newspapers voiced concern over the construction of a large trawler fleet in view of the recent lowering of the prices of iced fish (exported solely to the United Kingdom and Germany), and the depletion of fishing off the coasts of Iceland. In addition, British trawler owners have taken strong exception to the construction of the Icelandic trawlers.



Ireland (Eire)

FISHERIES REVIEW, 1947: Production and Prices: The Irish Minister for Agriculture states that sea fish landings during 1947 were less both as to quantity and value than those for 1946, due to the abnormal weather conditions in the early months of the year. Figures compiled to date for 1948 show a great improvement, according to a May 5 report from the American Legation at Dublin.

The total value of fish and shellfish landed in 1947 was \$2,628,067, compared with \$2,772,152 for 1946.

The value of shellfish taken during 1947 was \$428,383, as against \$509,820 for 1946. The main decline was in scallops, which dropped almost 50 percent. The value of crabs, lobsters and oysters was also down. On the other hand, the returns for crayfish and periwinkles showed substantial improvement. The principal landings in order of value were lobsters, periwinkles, oysters, and crayfish.

Table 1 - Irish Landings of Fish (Do Not Include Salmon & Shellfish), Quantity & Average Prices, 1942-47

Year	Quantity Lbs.	Avg. Prices \$ per cwt.
1947	35,396,368	6.21
1946	36,516,368	6.20
1945	41,656,944	5.33
1944	34,369,328	6.00
1943	31,126,032	6.60
1942	28,302,736	6.16

Fishing Fleet and Employment: The difficulties experienced in recent years in obtaining supplies of boats, engines and fishing gear were not reduced during 1947. However, the number of persons engaged in commercial sea fishing, either full time or part time, tended to rise. Full-time fishermen increased from 1,936 in 1946 to 1,955 in 1947, while the part-time men rose in number from 8,226 in 1946 to 8,277 in 1947. The number of vessels of all types used totaled 3,502 in 1947, as against 3,460 in 1946.

Through its marketing service for members, the Irish Sea Fisheries Association disposed of 8,170,288 pounds of fish and shellfish in 1947 as compared with 7,916,048 pounds in 1946.

Inland Fisheries: The unfavorable weather conditions which adversely affected the sea fisheries, also seriously restricted the potential output of those engaged on the inland fisheries. The catch of salmon and trout was somewhat better than in 1946, despite the severe weather early in the year. The price received for salmon and trout exported to Great Britain in

Table 2 - Irish Fish Landings by Principal Types, Quantity & Average Prices, 1946-47

Type or Species	1 9 4 7		1 9 4 6	
	Quantity	Avg. Price	Quantity	Avg. Price
	Lbs.	\$ per cwt.	Lbs.	\$ per cwt.
Demersal fish ...	16,091,824	9.92	17,521,728	9.41
Herring	13,990,816	3.20	11,255,328	3.46
Mackerel	4,285,120	3.38	7,496,608	2.97

1947. showed some improvement compared to the previous years.

The British Ministry of Food purchased the entire exportable surplus of the country's salmon catch in 1947, as had been done in each of the preceding five seasons. The terms were rather more favorable for the producers than previously.

Investigations into the life history of the Irish salmon were continued during the year, and investigations were also carried out on salmon, sea trout, and brown trout in various localities. Towards the end of the year arrangements were being made for an investigation into the life history of the Atlantic salmon.

NOTE: Values converted on basis of 1 pound sterling equals U. S. \$4.02.

Japan

BONIN ISLAND WHALING OPERATIONS, 1949: Whaling operations in the Bonin Islands by the Japanese have been completed for this season, February 20-May 22, 1949.

Bonin Island Whaling Catch, Feb. 20--May 22, 1949			
Species	Number	Products	Quantity Metric Tons
Sperm	85	Meat for food	1,409
Humpback	4	Whale oil	147
Sei	116	Blubber for food	401
Total	205	Blubber for leather	218
		Bone meal	158
		Sperm blubber	451
		Others	417
		Total	3,201

* * * * *

FINANCING DIFFICULTIES OF FISHING INDUSTRY: Since November 1948, the Japanese fishing industry in general has had increasing difficulty in obtaining funds to finance seasonal operations, preparation for which, in some fisheries have to be started many months before actual fishing operations, according to the June 4 Weekly Summary of SCAP. The financial situation of fishermen has been affected by the recent reduction in activities of the Reconstruction Finance Bank as a loaning agency of the Japanese Government. No adequate substitute plan of financing has been installed for the fisheries. The principal source of funds is from local banks, which reportedly already are heavily loaded and are opposed to assuming additional credit obligations.

* * * * *

U. S. AID TO FISHERIES: The Japanese fishing industry, which suffered severely during World War II, rapidly is being restored through the assistance provided from United States relief and rehabilitation funds, according to the July 30 Weekly Summary of SCAP's Natural Resources Section. Fish production in 1949 will reach an estimated 7 billion pounds and will again place Japan far ahead of all other fish-producing nations.

Japan's requirements for skillful fishermen, fishing boats, and adequate supplies of fishing materials (such as, nets, rope, and fuel oil) far exceed those of any other nation. Increased 1949 production will require about 1,250,000 fishermen operating more than 450,000 boats, and a tremendous amount of raw materials for fishing equipment. Present annual requirements for maintaining fishing gear and operating boats amount to about 39 million pounds of manila fibers, 26 million pounds of cotton, and 3½ million barrels of petroleum.

An extensive boat-building program and repatriation of fishermen rapidly made up the losses of fishermen and boats resulting from World War II. However, the most severe shortages occurred in fishing materials, such as nets and ropes, which were made almost entirely from imported raw materials. As a result, large quantities of supplies were needed in 1948 to replace old, worn-out gear. That year 86 million pounds of manila (or substitutes) and cotton fibers were obtained, in addition to 2½ million barrels of petroleum for operating the boats. As a result of these extensive imports in 1948, many of the cumulative needs of the fishermen were met, so that 1949 imports will be reduced to 65 million pounds, and to 62 million pounds in 1950.

The recovery of the Japanese fisheries has meant a substantial increase of indigenous food for the Japanese people. Aquatic products supply 85 percent of the animal protein of the Japanese diet, and the purchase of such products makes up 8 to 12 percent of the Japanese family budget.



Lebanon

SPONGE FISHERY, 1948: Production: Sponge production in Lebanon in 1948 was double that of 1947 because of the introduction of new sponge equipment imported from the United States and Great Britain, according to a March 30 American Consular report from Beirut. The capacity of the industry is stated to have been increased to four times that of 1947, but increased production, decreasing foreign demand and falling exports have caused a price drop of about 24 percent since early 1948, which will probably hold 1949 production to the 1948 figure or below. The increase in capital investment during 1948 was encouraged by the heavy foreign demand for sponges in 1947.

Consumption and Stocks: It is estimated that about 880 pounds per year are consumed locally. The total quantity of sponges of all varieties and grades now in the Lebanese market is approximately 2,200 pounds.

Foreign Trade: Foreign trade statistics are prepared by the Council Supérieur des Interets Communs for the Syro-Lebanese Customs Union as an entity, and therefore no separate official figures for Lebanon alone are available.

Table 1 - Sponge Production in Lebanon, 1948	
Variety	Quantity
	Lbs.
Fine (A)	1,580
(B)	1,100
(C)	330
Honeycomb (A)	1,540
(B)	880
(C)	290
Total	5,720

Foreign trade totals for the first nine months of 1948 show that the Syro-Lebanese Customs Union imported 2,430 pounds of sponges valued at \$4,860, as compared with 175 pounds valued at \$307 during the whole year of 1947. Beirut trade circles state that this vast increase in imports was the result of large purchases by Syrian merchants of sponges from Italy, Transjordan and France. Local importers and exporters state that these exceptionally large imports are no longer in the Lebanese half of the Customs Union.

A check of consular invoices shows that in 1948 Lebanese merchants shipped 2,180 pounds of sponges valued at \$17,000 to the United States alone. A total of 2,500 pounds of sponges were exported in 1948 as compared with 3,637 pounds in 1947.

Table 2 - Wholesale Prices of Sponges in Lebanon, March 18, 1949	
Variety	Price
	\$ per Lb.
Fine (A)	6.90
(B)	5.20
(C)	3.40
Honeycomb (A)	5.20
(B)	3.90
(C)	2.60

Market Situation and Prices: The drop in foreign demand and the increase in local production in 1948 have combined to depress the market price of sponges and to reduce the activity of the local market. Present wholesale prices average 24 percent below those of May 1948.

Outlook for 1949: If demand existed, the Lebanese sponge fishers could gather about

11,000 pounds of sponges in 1949, according to trade circles. The sponge beds are reported by these same circles to be able to supply this quantity without undue exhaustion, since modern equipment was first introduced in 1948. On the other hand, with prices falling, wages for divers will be lower and it appears unlikely that the total 1949 production will exceed that of 1948.

NOTE: Values converted on the basis of 3.50 Lebanese pounds equal U. S. \$1.00.



Malaya (British)

RESTRICTS FISH IMPORTS: The Controller of Imports and Exports at Singapore has stated that until further notice, applications for licences for imports from dollar countries will be considered only for a few specified goods which do not include any fish or fish products, according to the August 1949 Trade News of the Canadian Fisheries Department.



Norway

NORWEGIAN-BRITISH DISPUTE OVER NORWAY'S SEA BOUNDRIES: A Norwegian-British disagreement over Norway's sea boundaries may soon be placed before the International Court of Justice at The Hague, according to a report released the first week in August by the Norwegian Foreign Ministry. The official statement notes that negotiations, which began in London in January of last year, brought forth a proposed solution which the Norwegian Parliament has not been able to accept.

On July 19, the British Government replied that it was of decisive importance that the matter be placed before the International Court and asked whether it should be submitted jointly or by the British Government alone. Norway, on July 29, recommended that the latter course be followed and agreed to a British proposal to continue negotiations during the period that the case was before the Court. Should an agreement be reached before the Court decides the matter, both parties would request the Court's permission to withdraw the case.

In the interval, Norway will continue to enforce fully the fishing boundaries established by the Norwegian Royal Resolution of July 12, 1935.

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PACKS SARDINES IN HERRING AND OLIVE OILS: According to a statement made by a leading Norwegian sardine canner, the use of hydrogenated herring oil in the packing of sardines has proven successful, as reported by the August 1949 Trade News of the Canadian Fisheries Department. Under the current trade agreement with Great Britain, 500,000 cases of Norwegian canned fish packed in herring oil are to be shipped. French canneries are also importing Norwegian herring oil in bulk to use for their own products.

While herring oil has, apparently, been acceptable also in the U. S. market, there is a preference in the U. S. for fish packed in olive oil and a consequent demand for that product from Spain and Portugal. The Norwegian canners have now

suggested a plan by which they would obtain larger quantities of olive oil from Spain in exchange for increased exports of Norwegian dried fish, because they have decided that next year they will pack their sardines in olive oil.

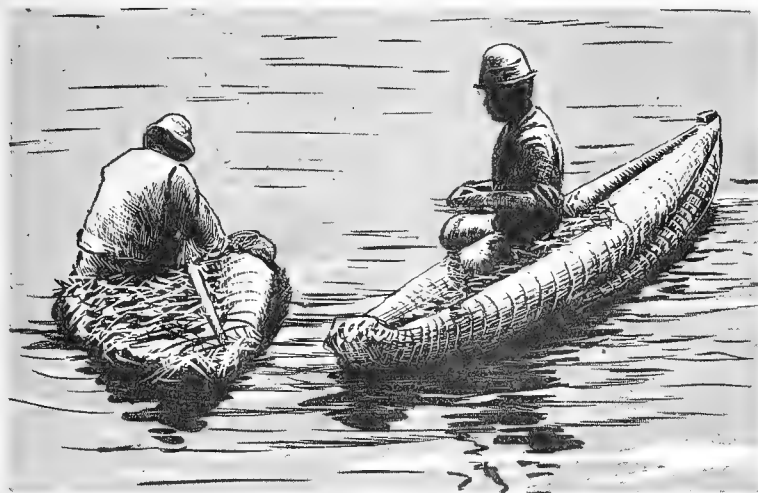
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POLLOCK FISHERY: Pollock purse seiners completed their season off Griptaren, Norway, with catches doubled over last year, due to the use of echo sounders in locating the schools of pollock. Experiments with pollock purse seines and the Danish floating trawl off of West Greenland have begun, according to the July 21 issue of Fiskaren.

TUNA FISHERY: Two large tuna purse seines have been used in Lovoyfjord with varying results. One took 28 large bluefin in one haul while the other took only 4 and had 18 tears in the seine. It is yet too early to say whether the large expensive seines are a success, but their operation is being observed with interest.



Peru



TYPICAL COMMERCIAL FISHING CRAFT (BALSAS) USED BY FISHERMEN (MOSTLY INDIANS) OF LAKE TITICACA IN PERU (THE HIGHEST NAVIGABLE LAKE IN THE WORLD) OPEN TO COMMERCIAL FISHING THE YEAR ROUND. THE BALSAS ARE MADE OF TOTORA.

FISHING INDUSTRY, 1948: The fishing industry of Peru continued to show a substantial production in 1948, although export shipments declined slightly, according to a recent American Consular report.

For the period January-November 1948, exports of canned fish--mainly solid packed bonito and tuna--totaled 3,423 metric tons, valued at approximately \$1,750,000, compared with 4,618 tons, valued at \$2,294,000 in 1947. There were 28 fish-canning plants in operation during 1948.

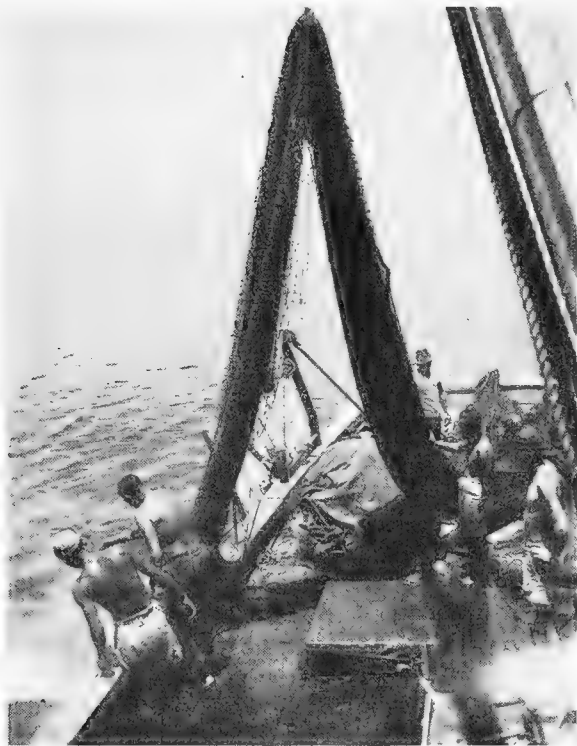
Exported for the first time in late 1948 were 250 tons of frozen tuna and 414 tons of frozen swordfish, with a total value of \$132,000.



Republic of the Philippines

LEYTE GULF YIELDS POOR FISHING: The Philippine Fishery Program vessels, the Theodore N. Gill and the David Starr Jordan returned to Manila on August 19 from

an exploratory voyage to Leyte Gulf and the Samar Sea. The vessels examined the possibilities of new dragging grounds for the otter trawl fishery and demonstrated fishing techniques to the fishing industry of Tacloban and Catbalogan.



BRINGING THE OTTER TRAWL ABOARD THE M/V THEODORE N. GILL.

Exploration with the otter trawl produced but limited quantities of fish, indicating that grounds within the 30 fathom curve of Leyte Gulf are not overly fertile and contain but few of the types of bottom fishes taken with trawling gear. Results of the work also indicate that the explored portions of this Gulf are foul with war debris and other obstructions which will prevent successful dragging.

The otter trawl demonstration in the lower Samar Sea also produced but a few hundred pounds of small fish. While this is not indicative of the productivity of the whole Samar Sea, the demonstration drags suggest that this area has been overfished.

in his opinion, the small catches made by the vessels could be due in part to the extensive use of explosives, and that the Philippines will soon be faced with serious depletion of its fishery resources unless efforts to curb illegal fishing are intensified.



Poland

CARP AND CRAB FISHERIES: The artificial water reservoir in Gaje (a suburb of Sluzewiec) is the property of the Central Fish Organization, according to a May 18 news release in Rzeczpospolita and reported on June 21 by the American Consulate at Warsaw. It is connected by canals with a network of concrete basins which constitute a transitory dwelling place for carp. More than 200 metric tons of fish passed through these basins last year, and were purchased by Warsaw. Motor-truck tanks bring the fish from various localities in Poland. The full fish season is September through December.

In the spring season, the Central Fish Organization deals with crabs. Empty fish basins have been utilized for the storage of crabs, and Gaje is gradually

becoming a crab export center. Two types of crabs are handled: "American" and "Polish". American crabs, having a very hard shell, lend themselves exclusively to processing, and a canning plant for processing American crabs will be established this year.

Polish crabs are not only distributed among local retail trade centers, but also exported alive. They are exported from Warsaw to Paris by airplane. The cost of the Polish crabs delivered to Paris is 61 cents a pound. Belgium and Switzerland will also receive Polish crabs.

These export plans call for organized crab breeding, and the use of small water areas for this purpose.

NOTE: Values converted on basis of official rate of exchange of 400 Polish zlotys equal \$1.00 U. S.



St. Vincent (British West Indies)

FISH IMPORTS CUT: In view of the serious dollar situation, the Government of St. Vincent (British West Indies) has found it necessary to make a 20 percent cut in fish imports the next five months. This was announced in the St. Vincent Government Gazette of July 15, 1949, according to the August Trade News of the Canadian Fisheries Department. The issue of all new licences for import from the dollar area will be withheld until further notice.



Sweden

BUILDING FISHING VESSELS FOR RUSSIA: A Russian Commercial Delegation was in Stockholm in June and ordered a series of 25 motor-driven fishing vessels from Swedish shipbuilding yards, according to the June 18 issue of the British publication, The Fishing News. These vessels will be of the "Swedish West Coast" type, 75 feet long, 35 metric tons, and are to cost approximately \$84,000 each. They will probably be ready for delivery in October this year.

It is known that other Swedish yards have recently delivered about 50 motor-driven vessels to Russia at a total cost of about \$1,700,000.

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SWEDISH-ICELANDIC TRADE PROTOCOL: On July 15, 1949, a new Swedish-Icelandic Trade Protocol covering the period April 1, 1949, through March 31, 1950, was signed in Stockholm, according to a July 22 report from the American Embassy at Stockholm. The Swedish Government, within the framework of its general Import Plan, will license the importation from Iceland of salted, sugared-and-salted, and spiced herring. The other traditional Icelandic export commodities, such as cod roe and mutton, will be imported "to the usual extent". Iceland will adjust its imports from Sweden according to the level of Swedish imports from Iceland.

Turkey

SPONGE PRODUCTION AND TRADE: Production: Turkey's present and potential production of sponges is handicapped by two factors:

1. Sponge-fishing boat owners have insufficient financial means from off-seasonal activities to prepare properly for the fishing season.
2. There are insufficient firms having the required personnel for the processing and exportation of Turkish sponges to permit healthy competition to flourish.

Under these circumstances, sponge fishers find themselves obliged to dispose of their produce through a limited number of concerns holding the market under a virtual monopoly, which prevents the development of the industry and market, according to a March 19 report from the American Consulate General at Istanbul.

Over-all sponge production for the year 1948, excluding low grade "sharta" sponges, amounted to 31 metric tons as against some 29 tons for the previous year (see table).

Methods of Fishing: Fishing methods vary in the various areas. In the Marmara-Dardanelles area, divers operate from small boats without diving equipment. In the Bodrum area two methods are used—dredging and diving with a mask. In the Marmaris and Cesme area three methods are used—divers with suits, divers without equipment, and dredging.

Estimated Turkish Sponge Production, 1948	
Type	Quantity Metric Tons
Turkish cups	0.7
" solids ..	2.5
Elephant's ear ..	0.25
Honeycomb	17.1
Fine	3.0
Velvet	7.0
Grass	0.5
Total	31.05



TURKEY-CUP SONGE SPECIMEN FROM THE MEDITERRANEAN SEA.

Consumption: Trade estimates place domestic consumption of sponges during 1948 at 5,280 pounds. These sponges were of low grade. About 3,080 pounds of this amount was purchased for the Turkish Army, Navy or other State-owned industrial organizations. The balance was consumed through regular market channels.

Stocks: Market circles estimate present stocks of sponges at some 6 metric tons, of which 11,550 pounds are in the hands of merchants and exporters.

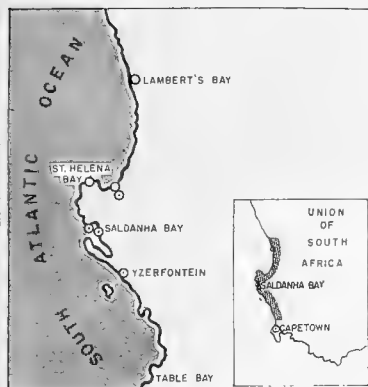
Foreign Trade: According to well informed trade circles, exports of the 1948 crop and stocks of the previous year totaled 72,000 pounds. The bulk went to Great Britain (35,274 pounds), followed by United States (19,841 pounds), and Netherlands (11,464 pounds).

Outlook: Fishing for sponges starts about the first of April, and market circles anticipate a substantial demand on the part of regular foreign purchasers.

Germany is also expected this year to enter the market with substantial purchases. This has resulted in preparations for the season by a much larger number of sponge-fishing boats. Furthermore, at least one export firm has decided this year to advance funds to a number of sponge-fishing boat captains to help them better to equip themselves for the coming season. Consequently, it is expected that this year's crop will reach and may even exceed 40 metric tons.



Union of South Africa



SOUTH AFRICAN COAST WHERE A CONSIDERABLE EXPANSION OF THE FISHERIES HAS TAKEN PLACE DURING THE PAST THREE YEARS.

BUILDS PRIVATE FISHING HARBOR AND PLANTS: South Africa's first private fishing harbor has been under construction since November last year at Yzerfontein, between Cape Town and Saldanha Bay, 15 miles from Darling, and will be finished by December 1949. It will be used as a base for pilchard and tuna fisheries, to supply a canning plant and fish reduction plant (daily capacity of 96,000 pounds), according to the British periodical, The Fishing News, of August 13, 1949.

The project (to cost approximately \$1,200,000) is based on American experience, and the company will use California-type boats and purse-seine methods. The reduction and canning plant will be in full production in 1950, while a 15-ton-an-hour shark liver factory is already in operation.



YZERFONTEIN, SOUTH AFRICA, WHERE A PRIVATE FISHING HARBOR AND NEW FISH MEAL, OIL, AND CANNING PLANT IS NOW BEING ERECTED. A SHARK LIVER OIL PLANT IS NOW IN OPERATION AT THIS SITE.

United Kingdom

EXPANDS FISHING FLEET: The president of the British Trawler Owner's Federation stated that British trawler owners have under construction or on order 80 new trawlers of the most up-to-date type, according to the July 16 British publication, Fish Trades Gazette. The cost (approximately \$32,240,000) is being found by private enterprise without any Government loan or backing. These new British trawlers will bring the catching capacity considerably over that of prewar, and the Federation is already preparing a scheme to keep the vessels in port in rotation to prevent glutting the market with unsaleable supplies of fish.

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IMPORTS CANNED SALMON FROM U. S. S. R.: Practically the whole of the total British imports of canned salmon during the first six months this year (3,808,000 pounds, valued at approximately \$2,100,000) originated in the Soviet Union, according to the August 27 Foreign Trade of the Canadian Department of Trade and Commerce.

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PURCHASES CANNED SARDINES FROM YUGOSLAVIA: Agreement has been reached in London with representatives of the Government of Yugoslavia for the purchase by the British Ministry of Food of 80,000 cases (8 million cans) of sardines (1949 pack), according to an August 2 report from the American Embassy at London.

The first shipment will leave Yugoslavia in September 1949 and supplies will be on sale in the United Kingdom next year. The sardines will be packed in the popular quarter-club can containing 4½ ounces net weight.



Yugoslavia

TECHNICAL FISHERIES SCHOOL: Upon the initiative of the Croatian Ministry of Fisheries, the first Yugoslav technical school for fisheries will be opened shortly at Zara (Zadar), according to a June 29 American consular report from Belgrade. The course of study will last three years.

During their first year, all students will pursue the same courses. In the two succeeding years students will specialize in one of several branches: fishing, scientific testing, the fishing industry, domestic and foreign trade in fishery products, etc.

In addition to their classroom work, the students will participate in fishing expeditions and oceanographical investigations, and will be given practical experience in canneries and in factories manufacturing fishing equipment.

Upon successful completion of the course, students will be granted a diploma as fishery technicians and will be qualified for leading positions in the fishing industry. Graduates will also be entitled to apply for commissions as reserve officers of the Yugoslav Navy.



International

SALTED COD—WORLD STUDY OF PRODUCTION AND MARKETING: The first in a series of fisheries studies, Salted Cod and Related Species, was issued in August by the Food and Agriculture Organization (see review of this publication on page 70 of this issue). This commodity study of salted cod and related species covers world landings, production, imports, exports, craft, fishing grounds, etc.

The report shows that in the interwar period 1920-39, the world's production of salted cod and related species averaged 259,000 metric tons (dried weight) annually. Four of the producing countries (France, Iceland, Newfoundland, and Norway) accounted for the bulk of salted fish production; the Latin countries in Europe and the Americas are the main consumers. Approximately 90 percent of total production entered international trade.

Fisheries in general play an important role in the economies of these countries, and salted fish forms a significant part of their fisheries industry. Thus their whole economy has always been very sensitive to changes in the salted fish trade.

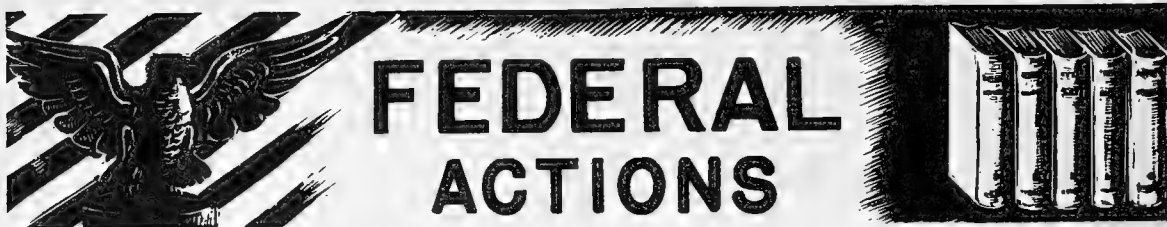
Production of salted cod and related species is confined mainly to fish caught off the eastern and western shores of the North Atlantic Ocean. Smaller quantities of salted fish are also produced from similar species caught in the Pacific Ocean, mainly by the United States and Japan, but this production is not considered in this study. The term "salted fish" comprises fish preserved by means of salt (sodium chloride) and includes the following species: cod (Gadus morrhua); haddock (Melanogrammus aeglefinus); hake (Merluccius merluccius); cusk or tusk (Brosme brosme); pollock, saithe, or coalfish (Pollachius virens); and ling (Molva molva). The producing countries are of two main types: those that base their industry almost entirely on exports (Canada, Faroe Islands, Iceland, Newfoundland, and Norway), and those that produce solely or mainly for domestic markets (France, Portugal, and Spain).

The outbreak of World War II in 1949 disrupted the salted fish industry. World production of salted cod and related species declined rapidly, and in 1943 and 1944, it totaled only about 1/3 of the average for the immediate prewar years. The main reason for the decline was the diversion to fresh and frozen products. However, by 1947, salted fish production was back to the 1938 volume. Total production for that year was 253,000 tons, somewhat more than the high 1938 production. The 1948 world figure is some 40,000 tons less than in 1947.

During the 1920's and 1930's, fish prices fluctuated greatly. In spite of quadrupled prices, postwar demand for salted fish has been high. Temporary gluts, however, emphasize the instability of markets.

Many salted fish exporting countries are expanding their fishing capacity, and landings are likely to increase further. If the present expanded markets for fresh and frozen products contract, some of the raw material now being utilized in these forms will be processed as salted and dried fish, and so add further to the substantial quantities which are already being produced.

There are many questions about production and distribution policies in relation to the salted fish industry to be solved for the future. Action coordinated through an international approach has yet to be tried. Even national approaches to these problems have been difficult because of diversified ownership of the tools of production and geographical and administrative decentralization in processing operations and the export trade.



Eighty-first Congress (First Session)

AUGUST 1949

Listed below are all the public bills, resolutions, etc., introduced and referred to committees, or passed by the Eighty-First Congress and signed by the President during August 1949 (unless otherwise specified), which affect in any way the fisheries and fishing and allied industries.

PUBLIC BILLS AND RESOLUTIONS INTRODUCED AND REFERRED TO COMMITTEES:

House of Representatives:

- H. R. 5867 (Tollefson) - A bill authorizing certain works for the improvement of navigation, the control of floods, and the conservation and utilization of the waters of the Columbia River and its tributaries, and for other purposes; to the Committee on Public Works.
- H. R. 5896 (Sheppard) - A bill to provide for research, studies, investigations and experimentations into the problems of aquatic weed and other water plant infestations; to the Committee on Agriculture.
- H. R. 5967 (Donohue) - A bill to raise the minimum wage standards of the Fair Labor Standards Act of 1938; to the Committee on Education and Labor.
- H. R. 6000 (Doughton) - A bill to extend and improve the Federal Old-Age and Survivors Insurance System, to amend the public assistance and child welfare provisions of the Social Security Act, and for other purposes; to the Committee on Ways and Means. (Coverage for the fisheries in the present Social Security Act includes "service performed in connection with the catching or taking of salmon or halibut, for commercial purposes, and service performed on or in connection with a vessel of more than ten net tons ..." but this bill adds self-employed individuals if "net earnings for the taxable year are less than \$400.")
- H. R. 6063 (Peterson) - A bill to authorize the Secretary of the Interior to carry out a research and development program with respect to natural sponges; to the Committee on Public Lands.
- H. R. 6064 (Peterson) - A bill providing for a study by the Bureau of Standards of the relative merits of natural and synthetic sponges; to the Committee on Interstate and Foreign Commerce.

The following bills introduced prior to August 1, 1949, were not previously reported under this section:

- H. R. 4880 (Scudder) - A bill to amend the Agricultural Act of 1948 by adding thereto a new section to establish an average parity price for fats and oils and to aid in maintaining such parity price to producers; to the Committee on Agriculture. (Introduced May 26, 1949.)

H. R. 5804 (McDonough) - A bill to prohibit the establishment of a valley authority in any State that would be substantially affected thereby until the people of the affected areas of such State have voted affirmatively for such valley authority; to the Committee on Public Works.

Senate:

S. 2489 (Pepper and Holland) - A bill to authorize the Secretary of the Interior to carry out a research and development program with respect to natural sponges; to the Committee on Interior and Insular Affairs.

S. 2490 (Pepper and Holland) - A bill providing for a study by the Bureau of Standards of the relative merits of natural and synthetic sponges; to the Committee on Interstate and Foreign Commerce.

RATIFICATION OF THREE INTERNATIONAL TREATIES:

Treaties ratified by the Senate on August 17 include the International Convention for the Northwest Atlantic Fisheries (Executive N), the Convention Between the United States and Mexico for Establishment of an International Commission for the Scientific Investigation of Tuna (Executive K), and the Convention Between the United States and Costa Rica for the Establishment of an Inter-American Tropical Tuna Commission (Executive P).

RESOLUTIONS PASSED BY THE HOUSE OF REPRESENTATIVES:

Investigation of Merchant Marine and Fisheries of the United States:

H. Res. 122 (Bland) - Investigations, Merchant Marine and Fisheries, funds (H. Res. 215). Passed the House on April 1, 1949.

H. Res. 215 (Bland) - Investigating certain matters pertaining to the merchant marine and fisheries of the United States. Passed the House on May 31, 1949.

H. Res. 233 (Bland) - Authorizing expenses of conducting investigation of certain matters pertaining to the merchant marine and fisheries of the United States. (H. Res. 215) Passed the House on June 23, 1949.

Alaska Delegate to Serve on Merchant Marine and Fisheries Committee:

H. Res. 294 (Bland) - To amend the Rules of the House to provide that the Delegate from Alaska shall serve on the Committee on Merchant Marine and Fisheries. Passed the House on August 2, 1949.

BILLS PASSED AND SIGNED BY THE PRESIDENT:

Shad and Sea Lamprey Investigations; and Fish Culture and Hatcheries:

H. R. 2740 (P. L. 249), Signed August 18, 1949 - Sec. 1 authorizes the Secretary of the Interior to establish and construct rearing ponds and a fish hatchery in the vicinity of Millen, Georgia, and in the Upper Peninsula of Michigan, at a cost of not to exceed \$250,000 and \$350,000, respectively; to rehabilitate and expand the rearing ponds and facilities at the fish cultural station at Cape Vincent, New York, at a cost not to exceed \$70,000; and to rehabilitate and place in efficient operating condition the rearing ponds and cultural facilities at Leadville, Colorado, at a cost not to exceed \$90,000.

Sec. 2 authorizes the Secretary to undertake, through the Fish and Wildlife Service, a comprehensive and continuing study of the shad

of the Atlantic Coast for the purpose of recommending to the Atlantic Coast States, through the Atlantic States Marine Fisheries Commission, measures to be taken to arrest decline, increase the abundance, and promote the wisest utilization of such shad resources at a cost of not to exceed \$75,000 per annum for a six-year period.

Sec. 3 amends joint resolution of August 8, 1946 (60 Stat. 930) and authorizes and directs the Director of the Fish and Wildlife Service to prosecute investigations of the abundance and distribution of sea lampreys and their effects on fishes, experiments to develop control measures, and a program for the elimination and eradication of sea lamprey populations of the Great Lakes; survey of the Great Lakes area to determine fish hatchery locations, if and when establishment becomes necessary; and report to Congress not later than December 31, 1950. Cost of this section shall not exceed \$359,000 for the first year and the sum of \$216,000 per annum thereafter.

Sec. 4 authorizes the necessary funds required under this Act. (Omnibus bill on fisheries which incorporated H. R. 961, H. R. 2501, H. R. 3046, and H. J. Res. 202.)

Transfer of Vessel "Black Mallard" to State of Louisiana:

H. R. 5365 (P. L. 237), Signed August 16, 1949 - Authorizes transfer of vessel Black Mallard to State of Louisiana for use and benefit of Department of Wildlife and Fisheries of such State.

Transportation on Canadian Vessels in Alaska:

H. R. 2634 (P. L. 258), Signed August 22, 1949 - To provide transportation of passengers and merchandise on Canadian vessels between Skagway, Alaska, and other points in Alaska, between Haines, Alaska, and other points in Alaska, and between Hyder, Alaska, and other points in Alaska or the continental United States, either directly or via a foreign port, or for any part of the transportation.



OUR OYSTER INDUSTRY

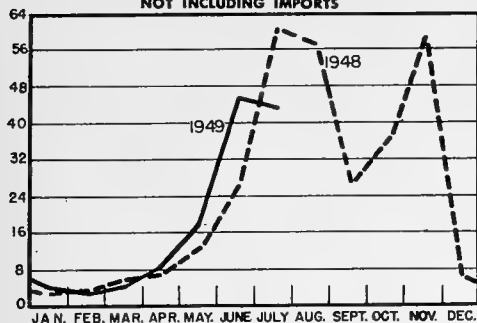
DO YOU KNOW . . .



- That the domestic pack of canned oysters amounted to more than 357,000 standard cases (48 No. 1 cans, 4-2/3 oz. net weight) during 1948, valued at more than 5 million dollars to the packers . . .

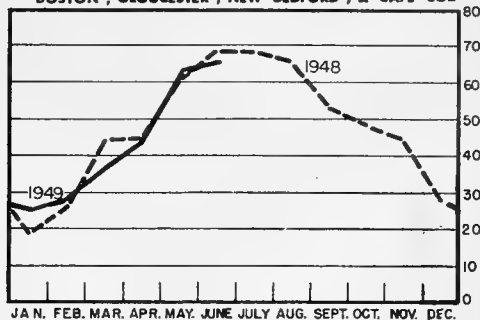
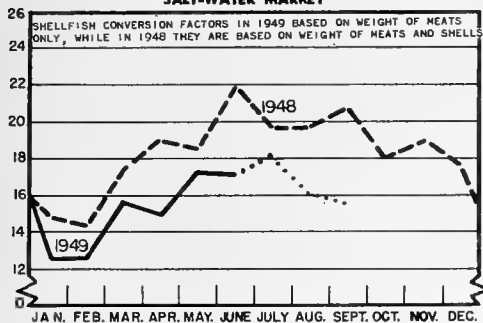
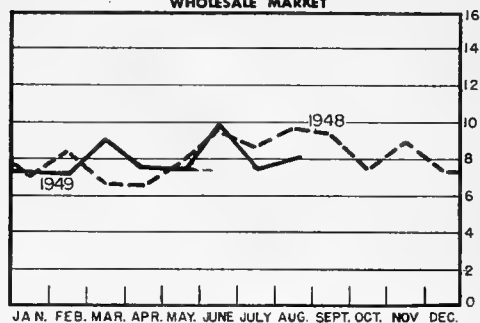
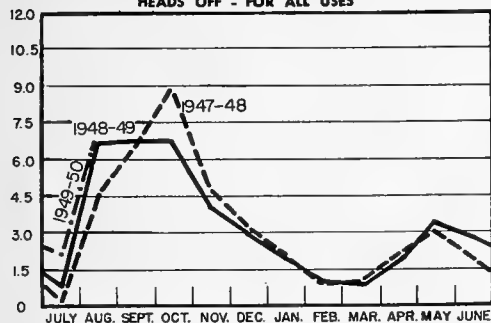
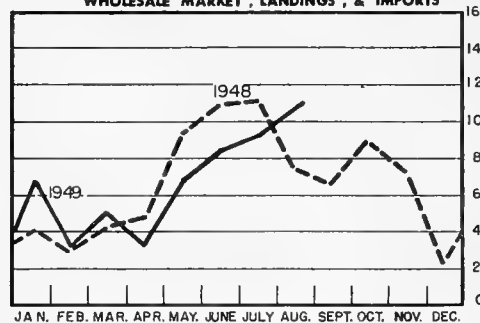
LANDINGS AND RECEIPTS

In Millions of Pounds

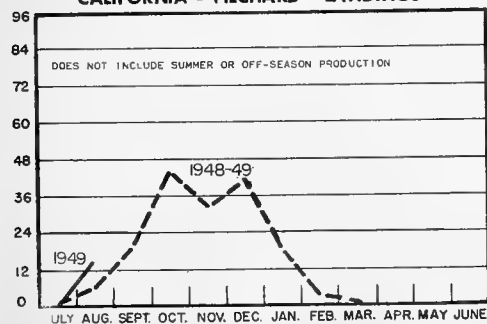
MAINE - LANDINGS
NOT INCLUDING IMPORTS

MASSACHUSETTS - LANDINGS

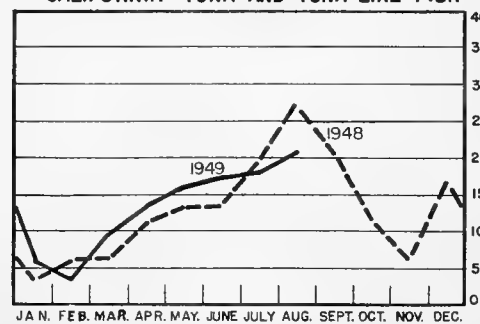
BOSTON, GLOUCESTER, NEW BEDFORD, & CAPE COD

NEW YORK CITY-RECEIPTS OF FRESH & FROZEN FISH
SALT-WATER MARKETCHICAGO - RECEIPTS OF FRESH & FROZEN FISH
WHOLESALE MARKETGULF - SHRIMP LANDINGS
HEADS OFF - FOR ALL USESSEATTLE - RECEIPTS OF FRESH & FROZEN FISH
WHOLESALE MARKET, LANDINGS, & IMPORTS

CALIFORNIA - PILCHARD LANDINGS



CALIFORNIA - TUNA AND TUNA-LIKE FISH

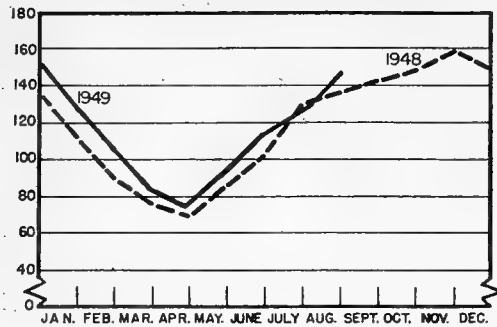


..... ESTIMATED

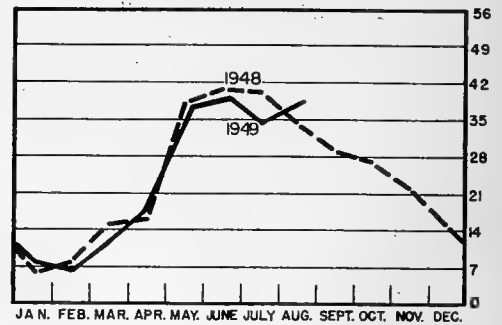
COLD STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS

In Millions of Pounds

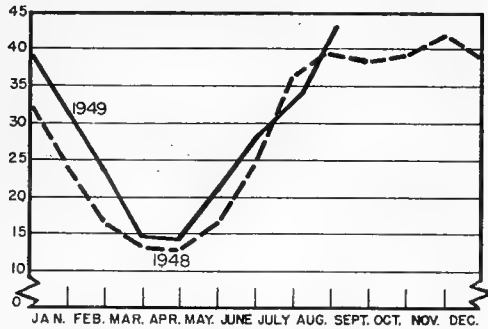
U.S. & ALASKA - HOLDINGS OF FROZEN FISH



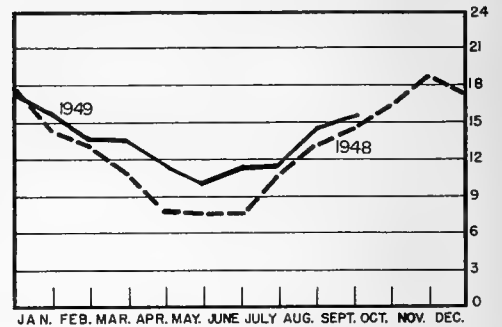
U.S. & ALASKA - FREEZINGS



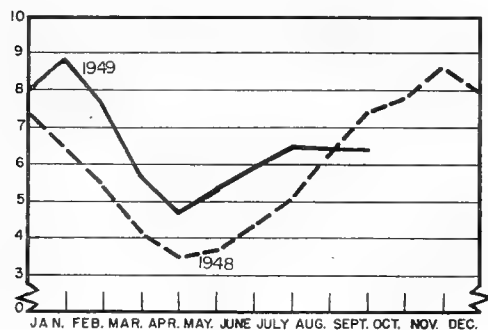
NEW ENGLAND - HOLDINGS OF FROZEN FISH



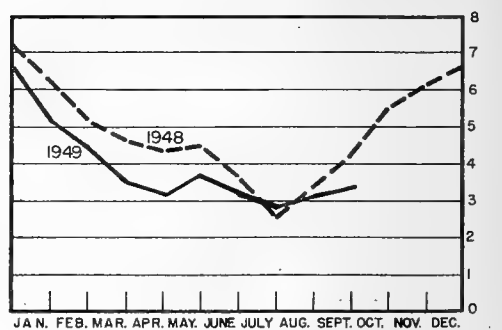
NEW YORK CITY - HOLDINGS OF FROZEN FISH



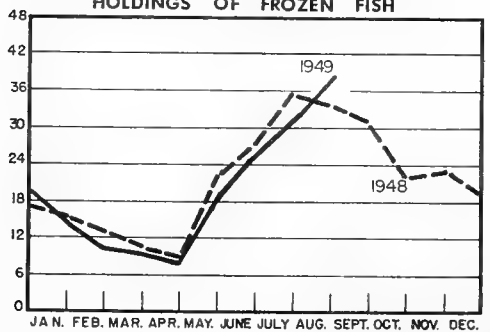
CHICAGO - HOLDINGS OF FROZEN FISH



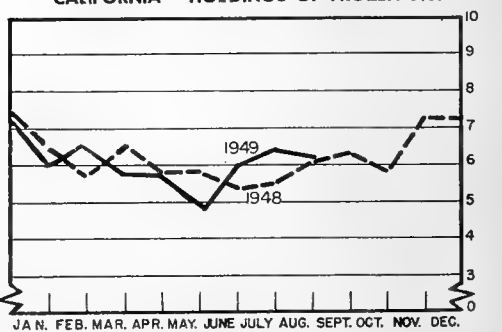
GULF - HOLDINGS OF FROZEN FISH



WASHINGTON, OREGON, AND ALASKA - HOLDINGS OF FROZEN FISH



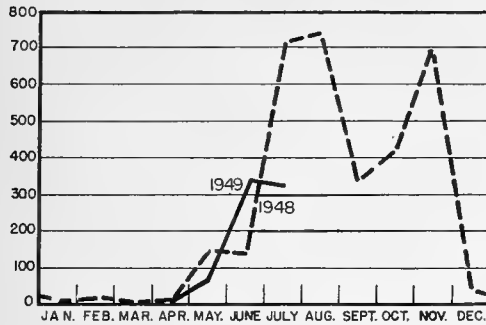
CALIFORNIA - HOLDINGS OF FROZEN FISH



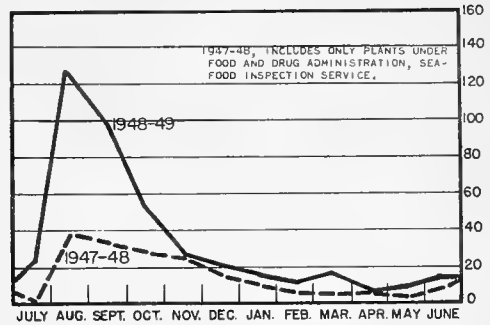
CANNED FISHERY PRODUCTS

In Thousands of Standard Cases

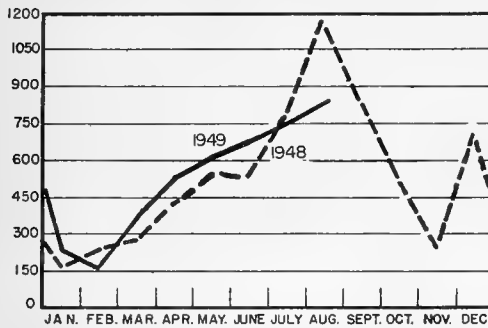
MAINE - SARDINES, ESTIMATED PACK



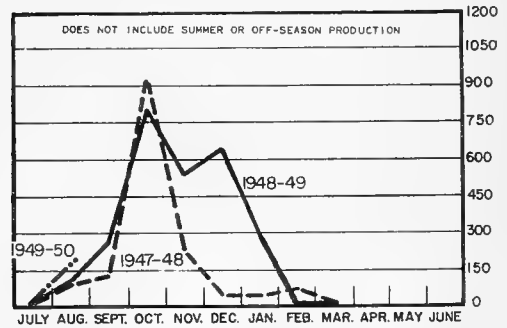
UNITED STATES - SHRIMP



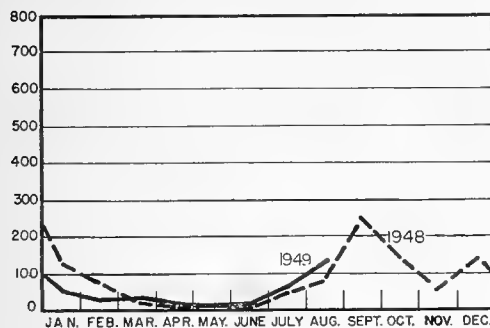
CALIFORNIA - TUNA



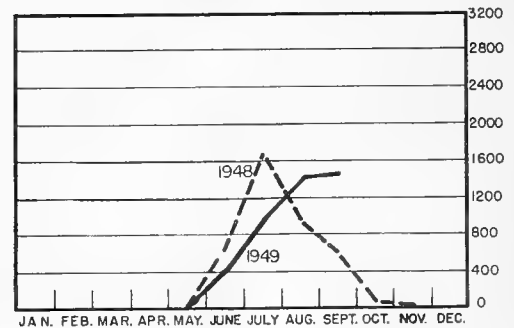
CALIFORNIA - PILCHARDS



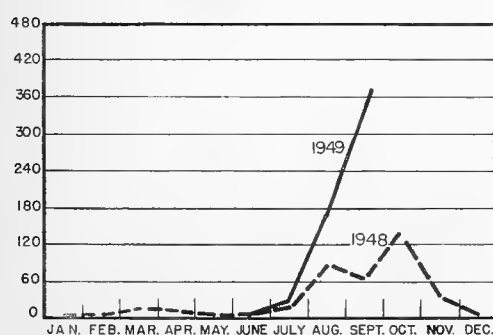
CALIFORNIA - MACKEREL



ALASKA - SALMON



WASHINGTON - PUGET SOUND SALMON

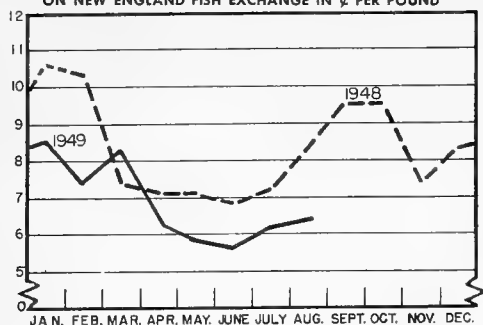


STANDARD CASES

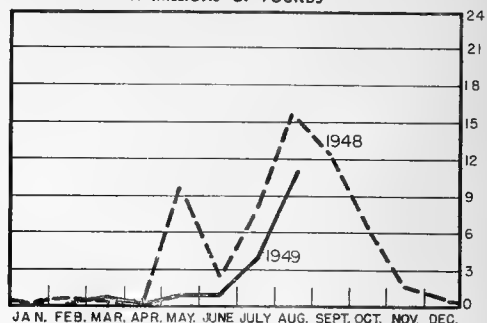
Variety	No. Cans	Can Designation	Net. Wgt.
SARDINES	100	1/4 drawn	3 1/4 oz.
SHRIMP	48	No.1 picnic	7 oz.
TUNA	48	No. 1/2 tuna	7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
MACKEREL	48	No. 300	15 oz.
SALMON	48	1-pound tall	16 oz.

PRICES, IMPORTS and BY-PRODUCTS

BOSTON - WEIGHTED AVERAGE PRICE
ON NEW ENGLAND FISH EXCHANGE IN ¢ PER POUND

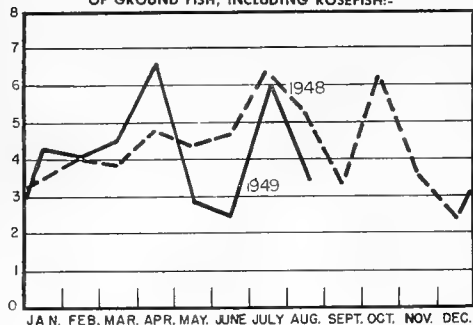


MAINE - IMPORTS OF FRESH SEA HERRING
IN MILLIONS OF POUNDS

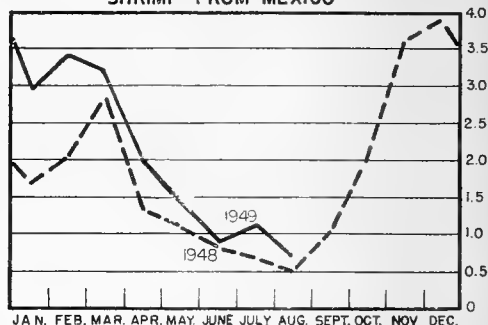


In Millions of Pounds

U.S. - IMPORTS OF FRESH & FROZEN FILLETS
OF GROUND FISH, INCLUDING ROSEFISH:-

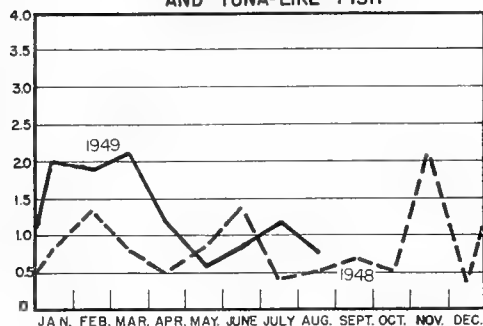


U.S. - IMPORTS OF FRESH AND FROZEN
SHRIMP FROM MEXICO

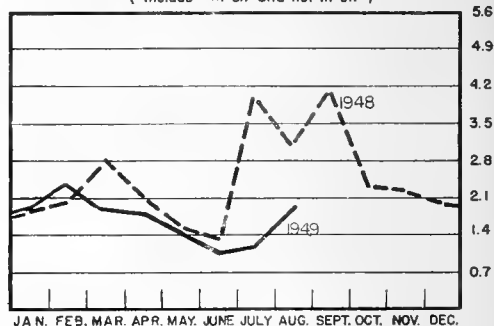


IN MILLIONS OF POUNDS

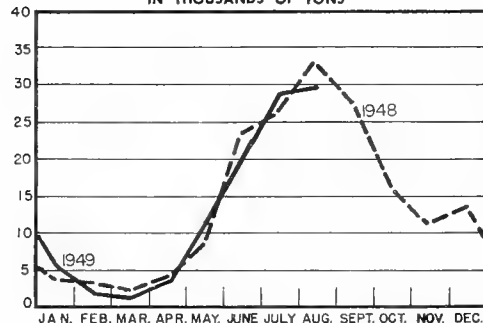
U.S. - IMPORTS OF CANNED TUNA
AND TUNA-LIKE FISH



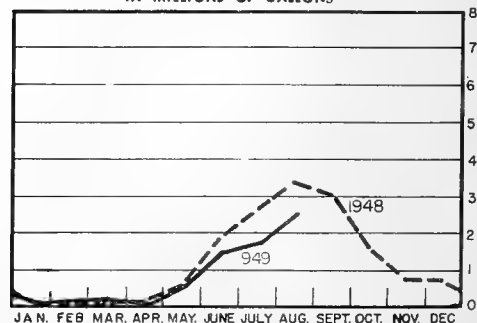
U.S. - IMPORTS OF CANNED SARDINES
(Include in oil and not in oil)



U.S. & ALASKA - PRODUCTION OF FISH MEAL
IN THOUSANDS OF TONS



U.S. & ALASKA - PRODUCTION OF FISH OIL
IN MILLIONS OF GALLONS





Recent publications of interest to the commercial fishing industry are listed below.

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
 FL - FISHERY LEAFLETS.
 MDL - MARKET DEVELOPMENT SECTION LISTS OF DEALERS, LOCKER PLANTS, ASSOCIATIONS, ETC.
 SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
 SEP. - SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number	Title
CFS-492	- Packaged Fish 1948 (Annual Summary)
CFS-490	- Massachusetts Landings, May 1949
CFS-493	- Fish Meal and Oil, July 1949
CFS-494	- Frozen Fish Report, September 1949
FL-350	- The Use of Rotenone as a Fish Poison

	Firms Canning:
SL-111	- Clam Products, 1948
SL-113	- Crab Meat, 1948
SL-101	- Salmon, 1948

Sep. 237 - E Value Ratios for Grayfish, Soupfin Shark, Sablefish, and Halibut
 Liver Oils Produced in the Pacific Northwest

ARTICLES BY FISH AND WILDLIFE SERVICE AUTHORS IN OTHER PUBLICATIONS

"The Clam and the Crab," by James Wharton. The Commonwealth, July 1949, vol. XVI, no. 7, pp. 7-9, 26, illus. Virginia State Chamber of Commerce, Richmond, Va., 15 cents per issue. This article, which completes a series dealing with Virginia's seafood resources, discusses historically the clam and crab fisheries of Virginia.

"On the Food Selectivity of Oysters," by Victor L. Loosanoff, article, Science, July 29, 1949, vol. 110, no. 2848, p. 122, single copies 25 cents. American Association for the Advancement of Science, Washington, D. C. A study on whether or not oysters show some selectivity in feeding. The author states that, at least in some instances, oysters can select their food not only quantitatively but also qualitatively.

MISCELLANEOUS PUBLICATIONS

THE FOLLOWING PUBLICATIONS MAY BE OBTAINED, IN MOST INSTANCES, FROM THE AGENCIES ISSUING THEM.

Aid to States in Fish Restoration and Management Projects, (H. R. 1746), Report No. 891, August 11, 1949, 2 p., printed. Senate Committee on Interstate and Foreign Commerce, Eighty-First Congress, First Session. Committee reports favorably on H. R. 1746 and recommends that the bill be passed. Discusses the purpose of the bill, which is to inaugurate a program of Federal aid to the States for the restoration and management of their fishery resources, and what it will accomplish.

Bulletin of Fisheries Research Laboratory, 1948, 140 p., in Greek, printed. Fisheries Directorate, Ministry of National Economy, Athens, Greece, 1949. This booklet discusses the Greek fisheries research laboratory. It contains chapters on the observations on the experimental oyster farm of Salamis; D. D. T. effects on the fishes; fish farming and its new development on marine fish cultivation; possibility of fishing in the Atlantic; the fish markets; the damage to the fishery economy in 1941-45; the fishing situation in 1947; the fishery economy in 1948; and the regulation of the marine fishery. Each of these chapters has an abstract in French or English.

"Canada and Newfoundland Sold Much Fish to Greece Last Year," by T. J. Monty, article, Foreign Trade, August 13, 1949, vol. VI, no. 137, pp. 282-4, printed, single issue 10 cents. Foreign Trade Service, Department of Trade and Commerce, Ottawa, Canada. Reviews the 1948 Greek fisheries production and prices, imports by type and country, and per capita consumption.

Distribution of Chitin in Crawfish, by C. L. Southall & Dr. N. J. van Rensburg, Progress Report No. 6, 4 p., processed. Fishing Industry Research Institute, Cape Town, South Africa, June 1949. Gives the results of tests carried out by the Institute to determine the amount of chitin present in crawfish and its distribution within the shellfish.

Fats and Oils Situation in the United Kingdom, 1948-49, by William Kling, Foods and Related Agricultural Products, World Trade in Commodities, vol. VII, Part 6, 7, and 8, July 1949, sup. no. 38, 12 p., processed. Office of International Trade, U. S. Department of Commerce, Washington, D. C. (Available to non-subscribers by purchase only at 5 cents per copy.) Reports on the United Kingdom's production, consumption, imports, and exports of fats and oils, including fish and whale oils.

Fish Commission Research Briefs, August 1949, vol. 2, no. 1, 30 p., printed, free. Fish Commission of Oregon, Portland, Oregon. Contains short reports of the current studies of the Commission's staff and the basis for conservation measures. The reports are: The Development of Artificial Propagation of Salmon in the West; Application of Ultraviolet Light to Fisheries Technology (discusses use of ultraviolet light for candling fish and detecting shell in crab meat); Willamette River Spring Chinook Sport Fishery of 1948; Observations on the Effect of Intertidal Blasting on Clams, Oysters and Other Shore Inhabitants; and An Incident of Furunculosis in Salmon at a Coastal Hatchery.

Fishing Eels - A Profitable Side Line, by L. R. Day, Circular, General Series, No. 13, December 1948, 3 p., illus., printed. Atlantic Biological Station, Fisheries Research Board of Canada, St. Andrews, N. B., Canada. Describes the common or American eel (*Anguilla bostoniensis*), how eels are fished, set-net eel fishing, eel-pot fishing, eel spearing, holding eels alive, maintenance of gear, and marketing.

The Food Manufacturing Industry in Germany during the period 1939-1945, edited by H. G. Harvey, British Intelligence Objectives Sub-Committee Overall Report No. 14, 134 p., printed, 2s6d (approximately 50 cents). Published for the British Intelligence Objectives Sub-Committee by His Majesty's Stationery Office, York House, Kingsway, London, W. C. 2, England, 1949. This work is a critical summary of almost every branch of the German food manufacturing industry, including fishery products. The major aim of the bulletin is to give special mention to novel features and to suggest, wherever possible, applications and improvements to their British counterparts. Of the 19 sections which comprise this report, the first 18 review different branches of the German industry from the British standpoint, while the remaining section assesses German developments in relation to the Australian food industry. One section is devoted to fish and fish canning and covers freezing and cold storage, smoke-curing, mechanical smoking devices, marinating, other unprocessed canned products, shrimp processing, fish meal and oil manufacture, albumen from fish, polymerized fish oils, flavoring materials from fish proteins, canned fish, and special cannery and filleting equipment.

Fourth Report to Congress of the Economic Cooperation Administration (For the period January 1-April 2, 1949), 146 p., printed, 35 cents. U. S. Government Printing Office, Washington, D. C., August 1949. The report covers activities under the Economic Cooperation Act of 1948 and the China Aid Act of 1948, as well as the program of economic aid to the Republic of Korea under the provisions of the Foreign Aid Appropriation Act of 1949. Although fishery products are not mentioned specifically, it will be of interest to members of the fishing industry interested in the ECA program.

The Mortality of Herring at Mud Bay, March, 1949, Circular No. 18, 3 p., processed, Pacific Biological Station, Fisheries Research Board of Canada, Nanaimo, B. C., August 1949. A discussion and report on a large compact body of dead herring discovered on March 20, 1949, in Mud Bay, located one-half mile south of Big Bay in Clatham Sound, B. C.

Natural History of Marine Animals, by G. E. MacGinitie and Nettie MacGinitie, 485 p., illus. with photographs and drawings, printed, \$6.00. McGraw-Hill Book Company, Inc., New York, N. Y., 1949. Although scientific in treatment, this book in a relatively non-technical style gives a general understanding of the ocean as an environment, and of the natural history phenomena of the animals that live there. In the first part of the volume, the authors discuss the ocean as an environment, comparing the living conditions of land animals with those of ocean animals, and the food available to the latter. Then the book takes up the animal kingdom by groups, proceeding from the simple to the complex, and describes in detail known natural history phenomena of many animals.

Preliminary Report to the Legislature (1949 Regular Session) on Fish and Game by the California Senate Committee on Fish and Game (Created Pursuant to Senate Resolution No. 108), 119 p., printed. California Senate Committee on Fish and Game, Redding, Calif., May 1948. This report has been prepared as the basis for a comparative study of the administration of fish and game problems in California with those of the other States of the United States, and contains a brief analysis and compilation of the laws and regulations in existence as of May 1, 1948, in each of the States.

Production of Fish in the Colonial Empire, C. F. Hickling, Circular No. 237, 14 p., printed, 4d (approximately 7 cents). His Majesty's Stationery Office, London, 1949. This is a review of the present and possible future production of the fisheries of the British Colonial Empire. There is considerable scope for increasing the Colonial fisheries production which can be absorbed by the Colonies themselves, with the exception of Aden, Hong Kong, Mauritius, and the Seychelles areas which may be able to produce some exportable surplus. The increase in production is mainly dependent on the mechanization of fishing vessels and methods, and the training of adequate personnel. These handicaps are slowly being overcome, but fishery development will be costly to the Colonial Governments. The establishment of a fish-culture training and research center will provide another valuable source of fish. Marine and fresh-water research is being provided for by a chain of stations in West Africa, the Colonial Great Lakes, East Africa, Malaya, and Hong Kong. The development of byproducts is not being overlooked.

Reef Fishing, by Agustin F. Umali and Herbert E. Warfel, 36 p., illus., processed, free. U. S. Fish and Wildlife Service, Philippine Bureau of Fisheries, in cooperation with the U. S. Information Service, Manila, Philippine Islands. The contents of this pamphlet fully explain and describe the many types of reef fishing--comparative landings of reef species, commercial reef species of fish, and fishing methods employed such as explosives and poisons, diving and spearing, fish pots, lines, reef drag seine, trap net, Bohol trap net, and Japanese trap net.

Regulation of Whaling (Hearing before a Subcommittee of the Committee on Interstate and Foreign Commerce, United States Senate, Eighty-First Congress, First Session, on S. 2080, a bill to authorize the regulation of whaling and to give effect to the international convention for the regulation of whaling, July 20, 1949), 58 p., printed. Available only from the Senate's Committee on Interstate and Foreign Commerce until exhausted. Contains the text of S. 2080 and the international convention, statements by the Chief Counsel of the Fish and Wildlife Service, the Special Assistant to the Under Secretary of State for Fisheries and Wildlife, the Director of the National Museum, and reports from the Department of State and the General Accounting Office.

Report on the Fisheries of Cyprus, by C. F. Hickling (with Notes by L. J. S. Littlejohn), 7 p., printed, 1s (approximately 20 cents). Department of Agriculture, Nicosia, Cyprus, 1948. Discusses the sea and lagoon fisheries of Cyprus, as well as fish culture.

Salted Cod and Related Species, by G. M. Gerhardsen and L. P. D. Gertenbach, FAO Fisheries Study No. 1, 208 p., illus., printed. \$2.00. Food and Agriculture Organization, Washington, D. C., July 1949. This booklet is a commodity study of salted cod and related species covering world landings, production, imports, exports, craft, fishing grounds, etc. Included, in addition to numerous appendices, are chapters on Volume of World Trade; Operational Features of the Salted Fish Industry; Institutional Factors--Influence of Government Action on Salted Fish Trade, 1920-39; Prices Obtained and Their Economic Consequences; Salted Fish Industry Since the Outbreak of World War II.

A great part of the information contained in the study consists of detailed tables, since similar data for the period under consideration (1920-48) have never been compiled and collated on an international basis. (See abstract of this publication appearing on page 59 of this issue.)

Statistic Tables of Fishing Vessels (as of the end of 1948), General Report No. 1, 257 p., printed, graphs, in Japanese and English (not available for general distribution). Japanese Fisheries Agency, Tokyo, Japan. This is the second annual report which lists the various types of data on the Japanese fishing fleet as obtained by a fishing vessel registration system. Statistics cover tabulations by type of fishery, vessel and boat, gear, principal prefectures; and include numerous comparisons.

The Story of the Maine Lobster (*Homarus americanus*), by Robert L. Dow, bulletin, 26 p., illus., printed. Department of Sea and Shore Fisheries, Augusta, Maine, July 1949. This bulletin gives a history of the Maine lobster industry; discusses lobster conservation, culture, distribution and marketing, methods of capture; and the biology of the Maine lobster.

Tide Tables Atlantic Ocean, 1950, Serial No. 722, 352 p., printed, 25 cents. Coast and Geodetic Survey, U. S. Department of Commerce, Washington, D. C., 1949. Contains full daily predictions for 65 reference stations and differences and constants for about 2,400 stations on the Atlantic Ocean and tributary waters. It contains also a table for obtaining the height of the tide at any time, a table of local civil time of sunrise and sunset for every fifth day of the year for different latitudes, a table for the reduction of local civil time to standard time, a table of moonrise and moonset for 8 places, and a table of Greenwich civil time of the moon's phases, apogee, perigee, greatest north and south and zero declination, and the time of the solar equinoxes and solstices.

Tide Tables East Coast North and South America, 1950, Serial No. 719, 226 p., printed, 25 cents. Coast and Geodetic Survey, U. S. Department of Commerce, Washington, D. C., 1948. Abridged edition of the publication reviewed immediately above.

Tide Tables Pacific Ocean and Indian Ocean, 1950, Serial No. 723, 423 p., printed, 50 cents. Coast and Geodetic Survey, U. S. Department of Commerce, Washington, D. C., 1949. Contains the same type of information as that reviewed on page 70 for the Atlantic Ocean except that the daily predictions are only for 37 reference ports and differences and constants are for about 1,000 stations in North America, South America, and the Hawaiian Islands.

Trading with Germany (Revision of July 1, 1949), 5 p., processed, free. Areas Division--European Branch, Office of International Trade, Department of Commerce, Washington, D. C. Purpose of this publication is to provide U. S. foreign traders with up-to-date information on trade regulations in effect in Germany. Contains detailed data on trade rules and regulations in effect in the Western Zone of Germany and the Western sector of Berlin; a brief section dealing with foreign trade in the Soviet Zone of Germany and the Soviet sector of Berlin.

Two Tuna Conventions Between the United States and Mexico and Costa Rica, Executive Rept. No. 11, July 25, 1949, 6 p., printed. Senate Committee on Foreign Relations, Eighty-First Congress, First Session. Discusses the purpose, background, cost, advantages, implementation, and necessary international action of the two tuna conventions between the United States and Mexico and Costa Rica. Includes a summary of the main provisions of these two conventions.



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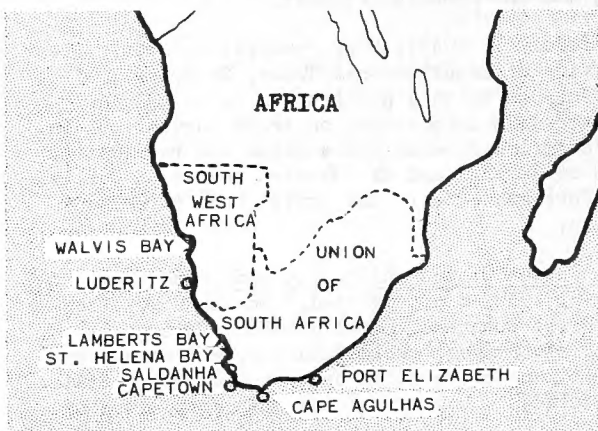
Illustrator -- Gustaf T. Sundstrom

Compositors -- Jean Zalevsky, Carolyn Wood

GROWTH OF SOUTH AFRICAN FISHERIES

Fishery Leaflet 347, "Growth of South African Fisheries," is a summary of the fisheries of South Africa and South West Africa.

This 10-page report discusses the regrouping of fisheries interests in this area of Africa (giving the names of the companies involved); the



increase of the catch (giving quantity, landed value, and number of vessels and fishermen engaged); availability of fish, together with a list of the species (giving the common and scientific name, annual catch, and approximate value); and the area of the fishing grounds.

In conclusion, this report states in part that the fishing industry in the Union of South Africa

is developing very rapidly today and the development on the whole seems to be sound and healthy.

Copies of Fishery Leaflet 347 may be obtained upon request, without charge, from the U. S. Fish and Wildlife Service, Washington 25, D. C.

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